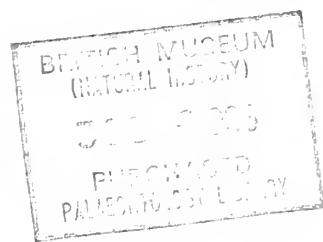


A Stereo-Atlas of Ostracod Shells

edited by R. H. Bate, D. J. Horne, J. W. Neale,
and David J. Siveter



Volume 13, 1986

Part 1 (pp.1-76); 30th May, 1986

Part 2 (pp. 77-151); 30th November, 1986

Published by the British Micropalaeontological Society, London

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Volume 13, Part 1; 30th May, 1986



Published by the British Micropalaeontological Society, London

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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the majority of papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows left valves of a tecnomorph (upper figure; PMO 113.64) and a female (PMO 113.169) of *Slepencia armata* (Henningsmoen, 1954); from the Llandovery Series, Silurian, at Slepden in Asker, Norway. Both specimens are in the Paleontologisk Museum, University of Oslo. See Pollicott & Siveter, *Stereo-Atlas of Ostracod Shells*, 12 (17), 85–92, 1985.

ON CYTHERETTA (CYTHERETTA) SEMIPUNCTATA (BORNEMANN)

by Roseline H. Weiss
(Geologisches Institut, University of Cologne, Germany)

Cytheretta (Cytheretta) semipunctata (Bornemann, 1855)

- 1855 *Bairdia semipunctata* sp. nov. J. G. Bornemann, Z. dt. geol. Ges., **7**, 359, pl. 21, figs. 1a-c.
 1952 *Cytheretta semipunctata* (Bornemann); E. Triebel, Notizbl. hess. L.-Amt Bodenforsch., **6**, 27, pl. 5, figs. 30a, b.
 ? 1958 *Cytheretta semipunctata* (Bornemann); C. Ellermann, Fortschr. Geol. Rheinld. Westf., **1**, 210.
 ? 1958 *Cytheretta semipunctata* (Bornemann); F. Goerlich, Fortschr. Geol. Rheinld. Westf., **1**, 216.
 ? 1963 *Cytheretta semipunctata* (Bornemann); van den Bold, Neues Jb. Geol. Paläont. Mh., **1963**, 114.
 1975 *Cytheretta semipunctata* (Bornemann); M. Faupel, Göttinger Arb. Geol. Paläont., **17**, 20, pl. 2, figs. 1a, b.
 non 1981 *Cytheretta semipunctata* (Bornemann); H. Uffenorde, Neues Jb. Geol. Paläont. Mh., **1980**, 152, pl. 3, fig. 18.
 1983 *Cytheretta (Cytheretta) semipunctata* (Bornemann); R. H. Weiss, Palaeontographica, Abt. A, **182** (1-3), 60, pl. 7, figs. 1-6, pl. 8, figs. 1-9, text-fig. 5.

Explanation of Plate 13, 2

Fig. 1, ♂ car., ext. dors. (GIK 932-1330, 775 µm long); fig. 2, ♀ car., ext. vent. (GIK 932-1336, 788 µm long).
Scale A (100 µm; × 120), figs. 1, 2.

Type specimens: The Ostracoda from the collection of Bornemann are presumed lost.

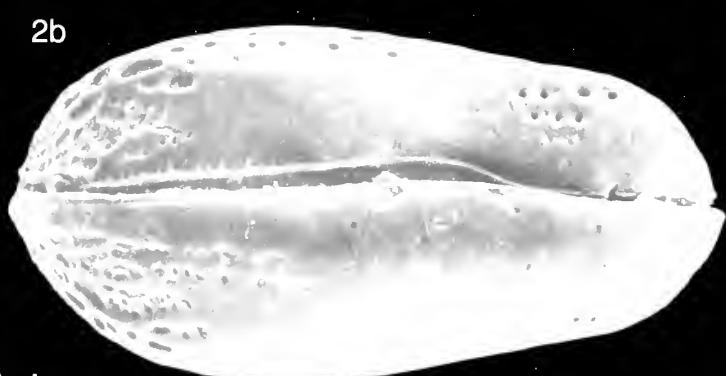
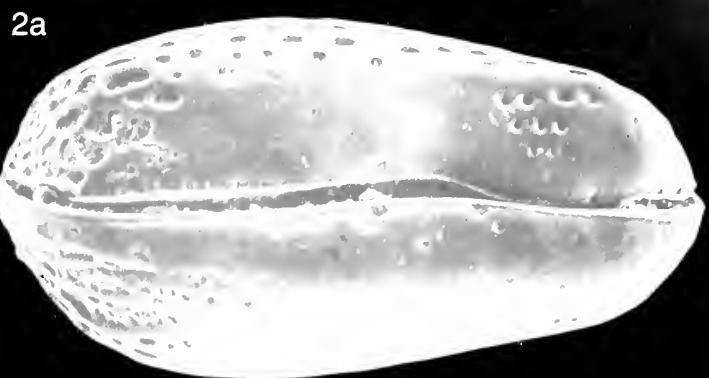
Type locality: Hermsdorf near Berlin, East Germany; middle Oligocene.

Figured specimens: Geologisches Institut, University of Cologne (GIK), nos. 932-1327 (♂ RV: Pl. 13, 8, fig. 2), 932-1328 (♂ LV: Pl. 13, 6, fig. 2), 932-1330 (♂ car.: Pl. 13, 2, fig. 1), 932-1332 (♀ RV: Pl. 13, 8, fig. 1), 932-1333 (♀ LV: Pl. 13, 6, fig. 1), 932-1334 (♂ RV: Pl. 13, 4, fig. 2), 932-1335 (♂ LV: Pl. 13, 4, fig. 1), 932-1336 (♀ car.: Pl. 13, 2, fig. 2). 932-1332 and 932-1333, 932-1327 and 932-1328, and 932-1334 and 932-1335 represent both valves of single carapaces.

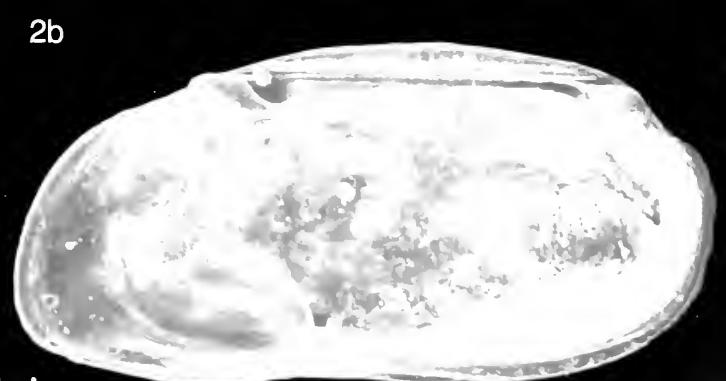
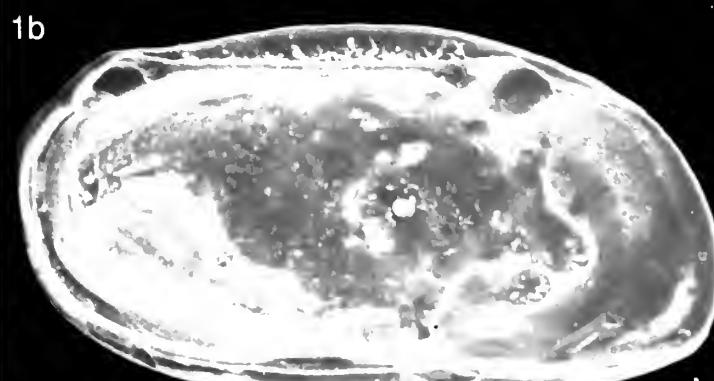
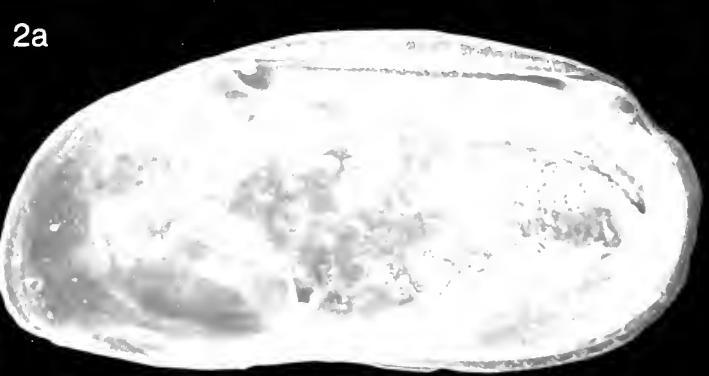
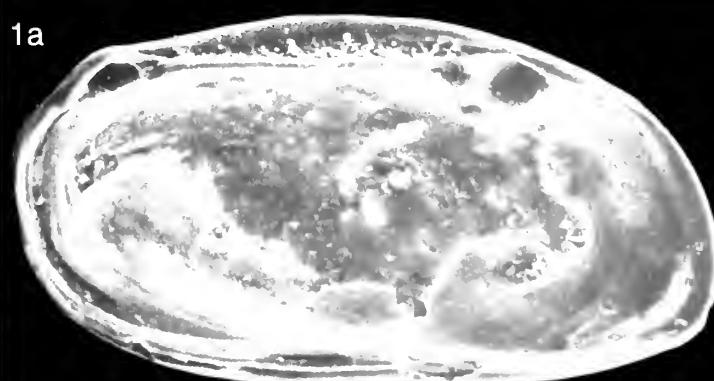
All specimens were collected by Prof. E. K. Kempf in 1961 at a depth of 54.2-55.5 m from shaft Tönisberg near Krefeld, Germany (German Nat. Grid Ref.: R 34033, H 97555; long. 6° 29'E, lat. 51° 25'N); upper Oligocene, *Sphenolithus ciperoensis* zone (NP25) according to Benedek & Müller (Neues Jb. Geol. Paläont. Mh., 1974, 388); fine sand (grain size 0.2-0.06 m = 92.5%) with abundant molusca and foraminifera according to Kempf (Niederrhein, 35, fig. 2, 1968); shallow marine (5-20 m water depth) according to Goerlich (Fortschr. Geol. Rheinld. Westf., 1, 220, 1958).

Explanation of Plate 13, 4

Fig. 1, ♂ LV, int. lat. (GIK 932-1335, 788 µm long); fig. 2, ♂ RV, int. lat. (GIK 932-1334, 775 µm long).
Scale A (100 µm; × 120), figs. 1, 2.



A



A

Size:	(A)	Sex	N	\bar{x}	L (μm)		H (μm)		L/H			
					Min	Max	\bar{x}	Min	Max	\bar{x}		
		♀ ♀ RV	10	784	763	813	421	413	438	1.860	1.824	1.909
		♂ ♂ RV	8	775	763	813	388	375	400	1.999	1.968	2.034
		♀ ♀ LV	9	799	775	825	485	475	500	1.652	1.550	1.690
		♂ ♂ LV	8	796	788	825	446	425	463	1.786	1.750	1.854
(B)		Sex	N	\bar{x}	L (μm)		W (μm)		L/W			
					Min	Max	\bar{x}	Min	Max	\bar{x}		
		♀ ♀ car.	5	798	775	825	395	388	400	2.019	1.938	2.095
		♂ ♂ car.	8	789	775	813	361	350	375	2.186	2.134	2.214

Table 1. Measurements on specimens of *C. semipunctata* N = no. of specimens; \bar{x} = mean; L = length; H = height; W = width; A = valves, B = carapaces.

Diagnosis:

Carapace strong. In dorsal view subovate with somewhat acuminate anterior end. In side view subrectangular. Anterior end obliquely truncated above, obtusely pointed subventral. Posterior end somewhat upwardly rounded. Left valve distinctly larger than the right one. Longitudinal rows of coarse pits are disposed along the middle of both valves. Posterior part covered with strong developed reticulation. Remainder of surface smooth. Posteriorly a narrow vestibulum is detectable.

Explanation of Plate 13, 6

Fig. 1, ♀ LV, ext. lat. (GIK 932-1333, 800 μm long); fig. 2, ♂ LV, ext. lat. (GIK 932-1328, 800 μm long). Scale A (100 μm ; $\times 107$), figs. 1, 2.

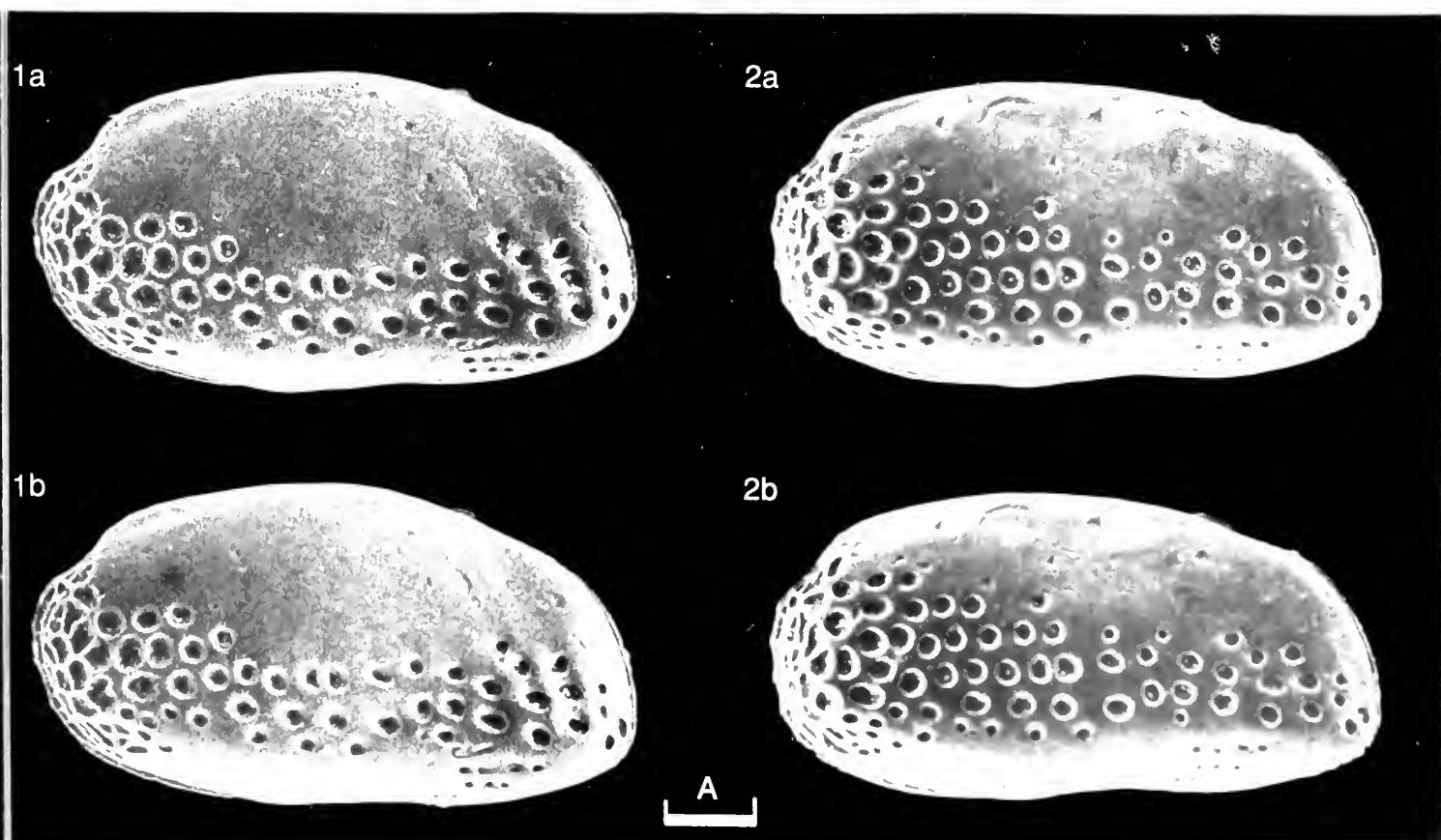
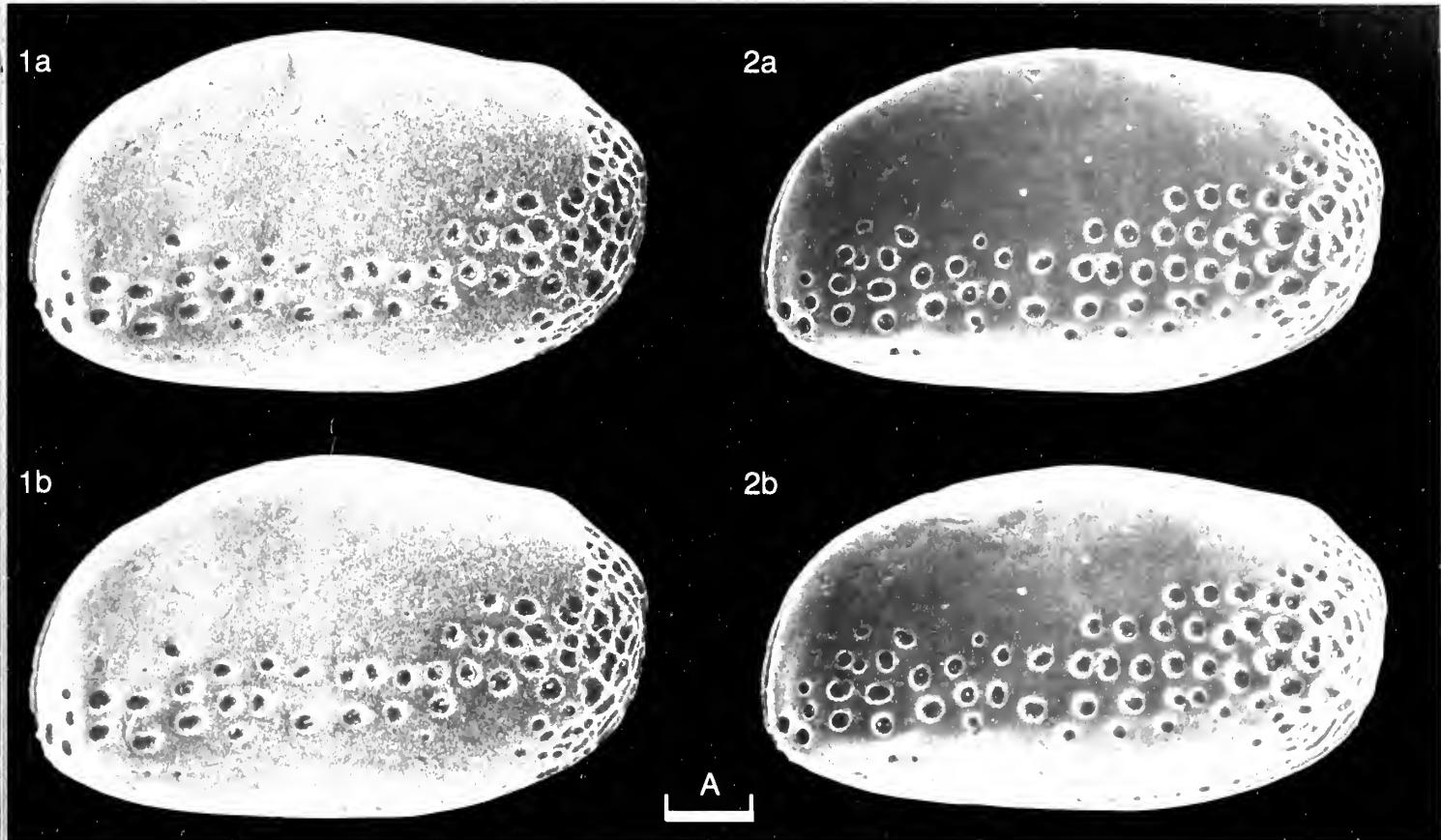
Remarks: Sexual dimorphism pronounced, the males being lower and, in dorsal view, narrower than the females, but almost of the same length. Two types of marginal pore canals are present in the posterior end of the valves: the first type is represented by a small number (mostly five) of long and large pore canals similar to those of the anterior and ventral parts of the margin; the second one, however, by numerous short, small and closely spaced pore canals. The two types of marginal pore canals reach the outer surface of the valves in two parallel lines of openings, both distally of the flange (discussed in detail by Weiss 1983, *op. cit.*).

Distribution: Middle Oligocene: Hermsdorf near Berlin, Germany (Bornemann 1855, *op. cit.*). Upper Oligocene: Doberg near Bünde; Dieckholzen near Hildesheim; Shaft Rumeln near Krefeld; Astrup near Osnabrück; Niederkaufungen near Kassel, Germany (Triebel 1952, *op. cit.*); Pohlkotte near Osnabrück, Germany (Hiltermann 1970); Shaft Höllkopf near Glimmerode (Kassel Basin), Germany (Faupel 1975, *op. cit.*); Shaft Rossenray (Lower Rhine Basin), Germany (Goerlich 1958, van den Bold 1963, *op. cit.*); Shaft Kapellen (Lower Rhine Basin), Germany (Ellermann 1958, *op. cit.*); Shaft Tönisberg (Lower Rhine Basin), Germany (Weiss 1983 *op. cit.*, and herein).

Acknowledgement: Thanks are due to the Deutsche Forschungsgemeinschaft for providing the Cambridge Stereoscan 180.

Explanation of Plate 13, 8

Fig. 1, ♀ RV, ext. lat. (GIK 932-1332, 775 μm long); fig. 2, ♂ RV, ext. lat. (GIK 932-1327, 775 μm long). Scale A (100 μm ; $\times 107$), figs. 1, 2.



ON CYTHERETTA (CYTHERETTA) JURINEI (V. MÜNSTER)

by Roseline H. Weiss
(Geologisches Institut, University of Cologne, Germany)

Cytheretta (Cytheretta) jurinei (v. Münster, 1830)

- ? 1830 Cythere Jurinii sp. nov. v. Münster, *Jb. Min. Geogn. Geol. Petref.-Kunde*, **1**, 62.
? 1835 Cytherina Jurinii (v. Münster); v. Münster, *Jb. Min. Geogn. Geol. Petref.-Kunde*, **6**, 445.
non 1838 Cytherina Jurinii (v. Münster); *Neues Jb. Min. Geogn. Geol. Petref.-Kunde*, **1838**, 516, pl. 6, fig. 12.
1863 Cythere Jurinei (v. Münster); O. Speyer, *Ber. Ver. Naturk. Cassel*, **15**, pl. 2, figs. 5a-d.
? 1894 Cythere Jurinei (v. Münster); E. Lienenklaus, *Z. dt. geol. Ges.*, **46**, 175.
non 1950 Cytheretta jurinei (v. Münster); G. Ruggieri, *Giorn. Geol.*, (Ser. 2), **21** (1949), 11, text-fig. 3, pl. 1, fig. 11.
1952 Cytheretta jurinii (v. Münster); E. Triebel, *Notizbl. hess. L.-Amt Bodenforsch.*, **6**, 23, pl. 3, figs. 16, 17.
1975 Cytheretta jurinii (v. Münster); M. Faupel, *Göttinger Arb. Geol. Paläont.*, **17**, 18, pl. 2, figs. 2a, b.
1983 Cytheretta (Cytheretta) jurinei (v. Münster); R. H. Weiss, *Palaeontographica*, Abt. A, **182** (1-3), 54, pl. 4, figs. 1-6, pl. 5, figs. 1-8, pl. 6, figs. 1-7, text-figs. 2-4.

Type specimens: The Ostracoda from the collection of v. Münster are presumed lost.

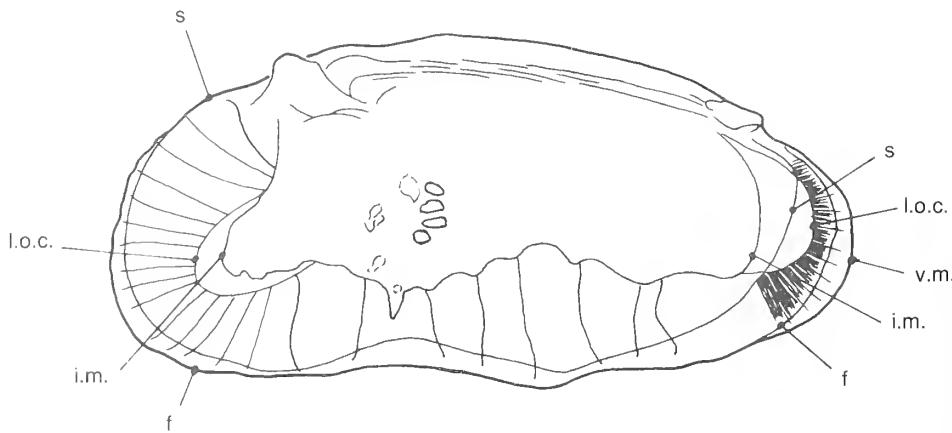
Type locality: Astrup near Osnabrück, Germany; upper Oligocene.

Figured specimens: Geologisches Institut, University of Cologne (GIK), nos. **932-1314** (σ LV: Pl. 13, 10, fig. 2), **932-1315** (σ RV: Pl. 13, 16, fig. 2), **932-1317** (σ RV: Pl. 13, 14, fig. 2), **932-1319** (φ RV: Pl. 13, 16, fig. 1), **932-1321** (φ RV: Pl. 13, 14, fig. 1), **932-1322** (φ car.: Pl. 13, 12, fig. 1), **932-1323** (σ car.: Pl. 13, 12, fig. 2), **932-1324** (σ car.: Pl. 13, 10, fig. 1). Nos. **932-1314** and **932-1315** represent both valves of a single carapace.

Explanation of Plate 13, 10

Fig. 1, σ car., ext. dors. (GIK **932-1324**, 1325 μm long); fig. 2, σ LV, int. lat. (GIK **932-1314**, 1338 μm long).
Scale A (100 μm ; $\times 71$), figs. 1, 2.

Figured specimens: All specimens were collected by Prof. E. K. Kempf in 1961 at a depth of 54.2-55.5 m from shaft Tönisberg near Krefeld, Germany (German Nat. Grid Ref.: R 34033, H 97555; long. $6^{\circ} 29' \text{E}$, lat. $51^{\circ} 25' \text{N}$); upper Oligocene, *Sphenolithus ciperoensis* Zone (NP25) according to Benedek & Müller (*Neues Jb. Geol. Paläont. Mh.*, **1974**, 388); fine sand (grain size 0.2-0.06 mm = 92.5%) with abundant mollusca and foraminifera according to Kempf (*Niederrhein*, **35**, fig. 2, 1968); shallow marine (5-20 m water depth) according to Goerlich (*Fortschr. Geol. Rheinld. Westf.*, **1**, 220, 1958).

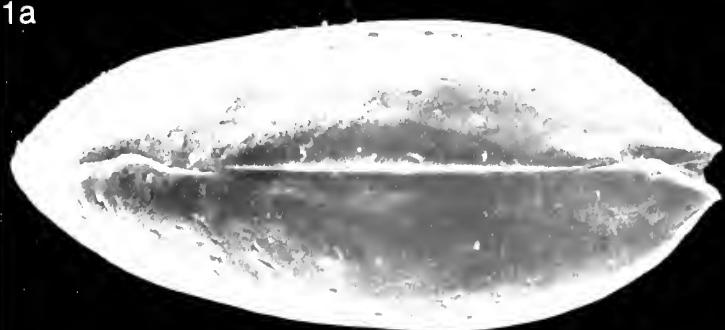


Text-fig. 1. Cytheretta (C.) jurinei (v. Münster, 1830); σ RV, internal view, structure of margin. s: selvage; fl: flange; l.o.c.: line of concrescence; i.m.: inner margin; v.m.: valve margin.

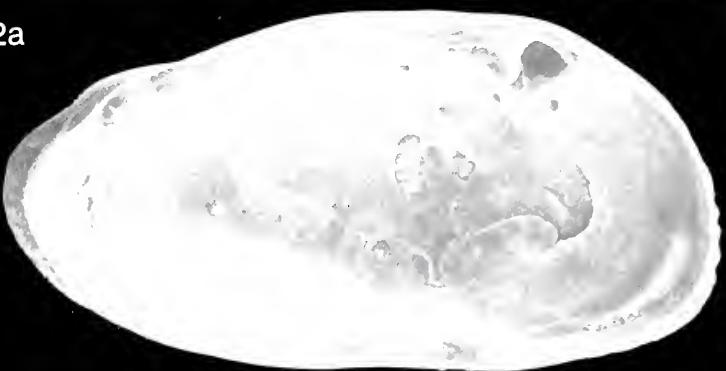
Explanation of Plate 13, 12

Fig. 1, φ car., ext. vent. (GIK **932-1322**, 1275 μm long); σ car., ext. vent. (GIK **932-1323**, 1313 μm long).
Scale A (100 μm ; $\times 73$), figs. 1, 2.

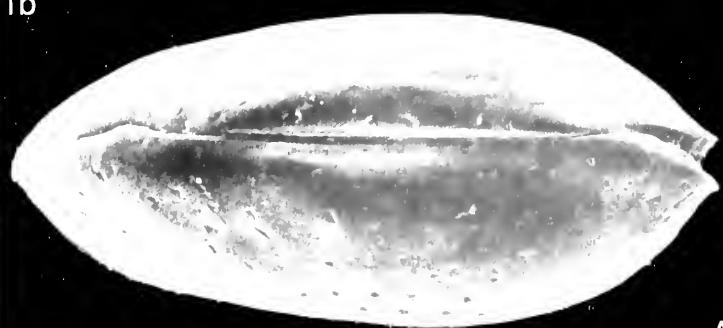
1a



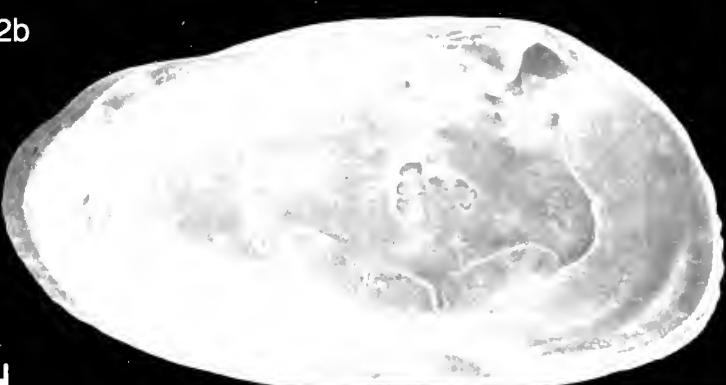
2a



1b



2b

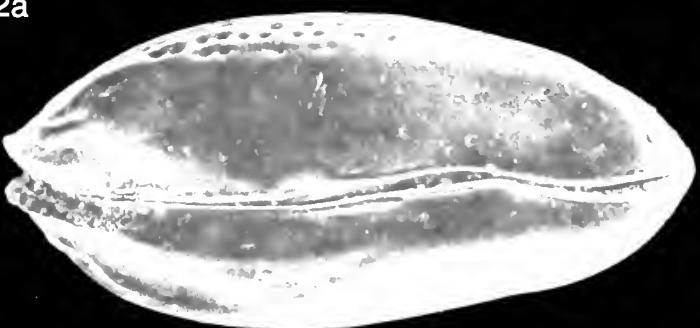


[A]

1a



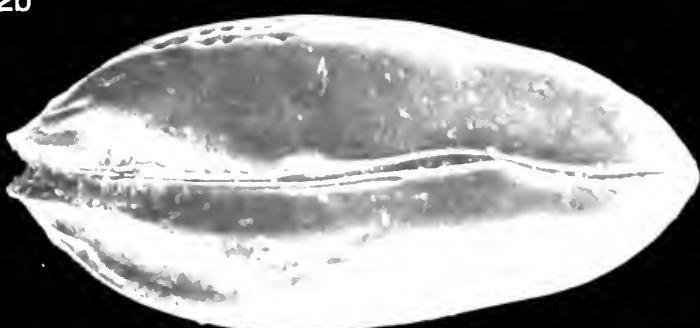
2a



1b



2b



[A]

Size: (A)	Sex	N	\bar{x}	L (μm)		H (μm)		\bar{x}	L/H		
				Min	Max	Min	Max		Min	Max	
	♀ ♀ RV	20	1185	1100	1288	587	538	625	2.018	1.917	2.069
	♂ ♂ RV	20	1290	1225	1350	618	588	638	2.088	1.998	2.160
	♀ ♀ LV	22	1175	1113	1288	634	600	675	1.853	1.781	1.981
	♂ ♂ LV	20	1303	1250	1350	665	625	700	1.960	1.911	2.000

(B)	Sex	N	\bar{x}	L (μm)		W (μm)		\bar{x}	W/H		
				Min	Max	Min	Max		Min	Max	
	♀ ♀ car.	13	1203	1150	1275	569	525	600	2.117	2.043	2.217
	♂ ♂ car.	13	1321	1275	1375	589	550	613	2.246	2.188	2.377

Table 1. Measurements on specimens of *C. jurinei* (N = no. of specimens; \bar{x} = mean; L = length; H = height; W = width); A = valves, B = carapaces.

Diagnosis: Carapace strong; In dorsal view elongate – ovate with somewhat acuminate anterior end and beak – shaped posterior end. In side view elongate – ovate. Left valve distinctly larger than right valve. Surface of the valves smooth but with longitudinal rows of pits in the middle. Anteriorly and posteriorly vestibules are present.

Explanation of Plate 13, 14

Fig. 1, ♀ RV, ext. lat. (GIK 932-1321, 1288 μm long); ♂ RV, ext. lat. (GIK 932-1317, 1300 μm long). Scale A (100 μm; $\times 74$), figs. 1, 2.

Remarks: Sexual dimorphism pronounced, the males being more elongate, somewhat higher and, in dorsal view, slightly more tumid than the females. On the right valve of the male there is a strong developed ventral prolongation of the flange, which is missing on the female. Differences discussed in detail by Weiss (1983, *op. cit.*). Two types of marginal pore canals are present in the posterior end of the valves: the first type is represented by 8 to 12 long and large pore canals similar to those of the anterior and ventral part of the margin, the second one however, by numerous short, small and very closely packed pore canals. The two types of marginal pore canals reach the shell surface in two parallel lines of openings, both distally of the flange.

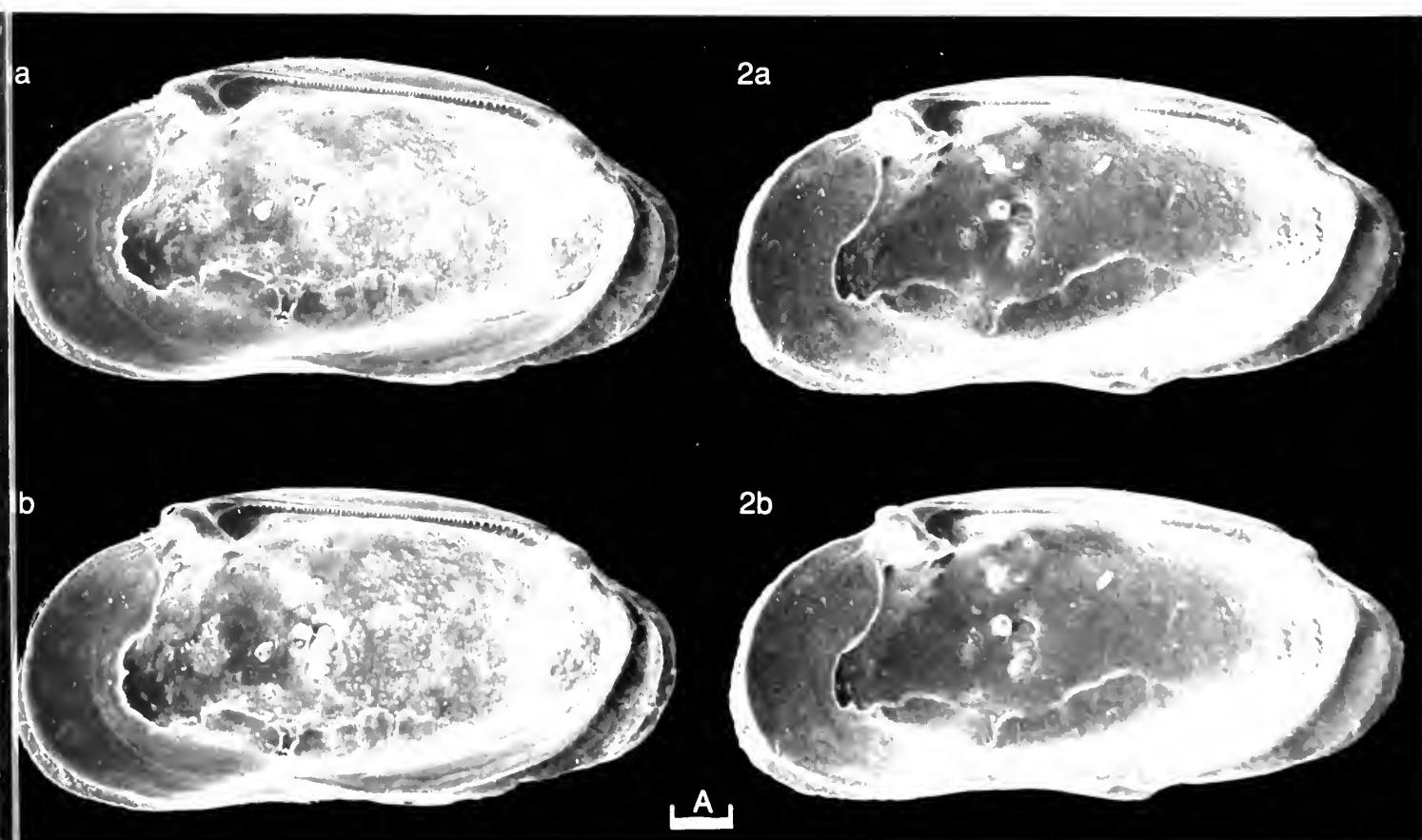
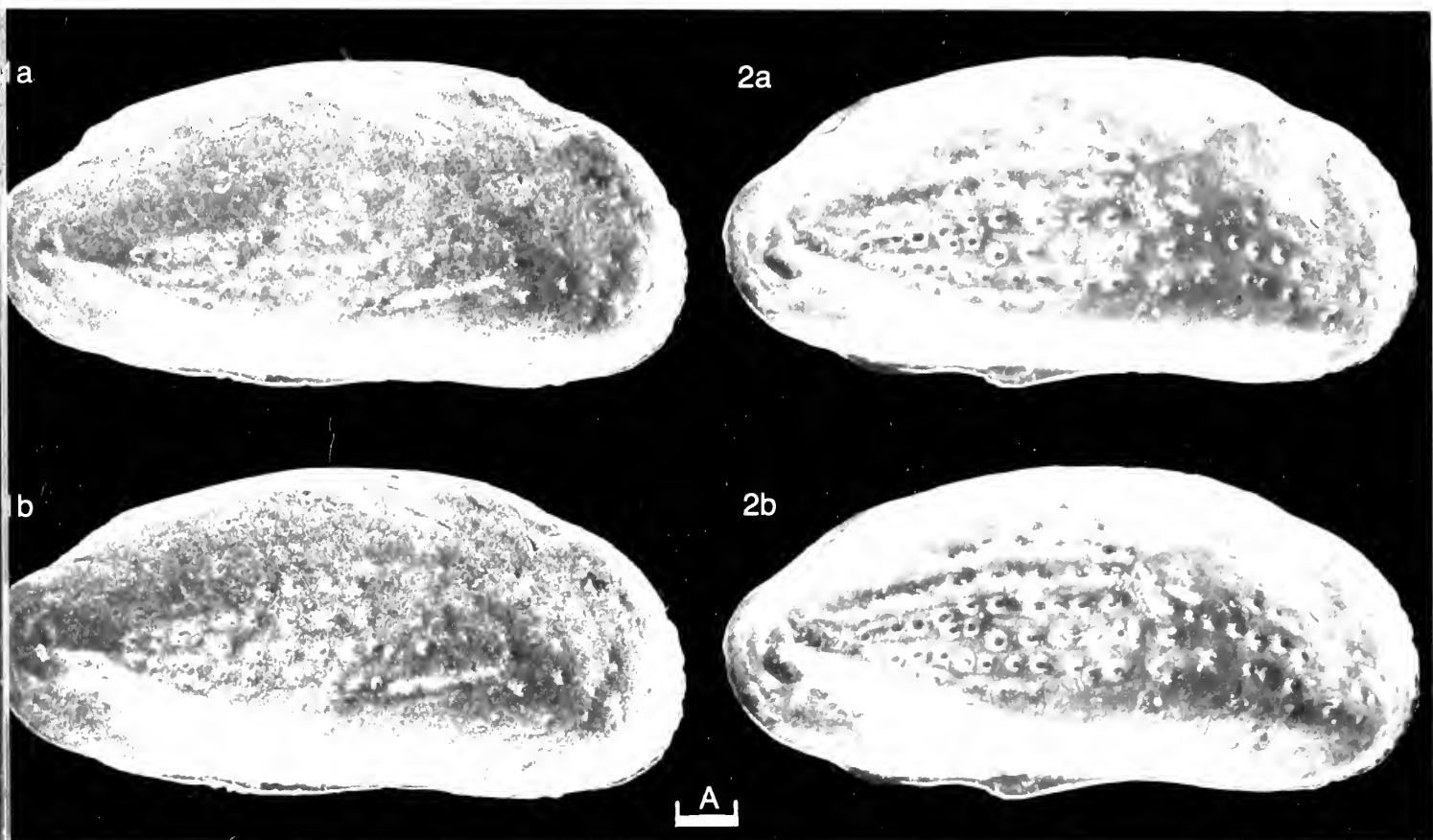
Distribution: Upper Oligocene: Astrup near Osnabrück, Germany (v. Münster 1830, Lienenklaus 1894, Triebel 1952, *op. cit.*); Wilhelmshöhe near Kassel, Germany (v. Münster 1830, *op. cit.*); Ahnegraben and Niederkaufungen (Kassel Basin), Germany (Speyer 1863, Lienenklaus 1894, *op. cit.*); Bünde, Neuer Wirth near Osnabrück; Göttenstrup, Freden, Güntersen near Göttingen; Erlenloch near Kassel; Krefeld, Germany (Lienenklaus 1894, *op. cit.*); Höllkopf near Glimmerode (Kassel Basin), Germany (Faupel 1975, *op. cit.*); Shaft Kapellen (Lower Rhine Basin), Germany (Ellermann 1958); Shaft Rossenray (Lower Rhine Basin), Germany (Goerlich 1958); Shaft Tönisberg (Lower Rhine Basin), Germany (Weiss 1983, *op. cit.*, and herein.). Middle Oligocene: Harleshausen (Kassel Basin), Germany (Speyer 1863, Lienenklaus 1894, *op. cit.*).

Lower Oligocene: Brandhorst near Bünde, Germany (Lienenklaus 1894, *op. cit.*).

Acknowledgement: Thanks are due to the Deutsche Forschungsgemeinschaft for providing the Cambridge Stereoscan 180.

Explanation of Plate 13, 16

Fig. 1, ♀ RV, int. lat. (GIK 932-1319, 1250 μm long); ♂ RV, int. lat. (GIK 932-1315, 1300 μm long). Scale A (100 μm; $\times 74$), figs. 1, 2.



ON PARACYTHEROMORPHA RIMAFOSSA MAYBURY & WHATLEY gen. et sp. nov.

by Caroline A. Maybury & Robin C. Whatley
(University College of Wales, Aberystwyth)

Genus *PARACYTHEROMORPHA* gen. nov.

Type-species: *Paracytheromorpha rimafoissa* sp. nov.

Derivation of name:

Diagnosis:

Greek; like *Cytheromorpha* Hirschmann, 1909 (*Medd. Soc. Fauna Flora fenn.*, **35**, 290-292).

Very small to medium sized; elongate, subrectangular to elliptical in lateral view. Anterior and posterior margins rounded. Micropunctate to coarsely reticulate, some species celate. Eye tubercle/spot absent. Hinge in right valve: smooth groove and elongate posterior bar smooth or dentate. No anterior terminal element. Left valve has complementary structures. Muscle scars just below mid-point: curved row of four closely adjacent or contiguous adductors + "c"-shaped frontal open dorsally. Fulcal point crescentic, usually a weakly incised, circular depression between adductor row and frontal scar. Sexual and precocious sexual dimorphism pronounced.

Remarks: *Paracytheromorpha* differs from *Cytheromorpha* by the lack of an eye spot or tubercle. Also, in *Cytheromorpha* the hinge is gongylodont. The hinge of *Paracytheromorpha* is reminiscent of that of other loxoconchids such as *Elosonia* Wagner, 1957 (*Sur les Ostracodes du Quaternaire récent des Pays-bas et leur utilisation dans l'étude géologique des dépôts Holocènes*, Mouton & Co., The Hague, 71; see also Whittaker, J. E., *Stereo-Atlas Ostracod Shells*, **1**, 193-204) and *Phlyctocythere* Keij, 1958 (*K. Nederl. Akad. Wetensch. Proc.*, ser. B, **61**(1), 72). Nine other Upper Pliocene species (six from St. Erth, England and NW France and three confined to St. Erth) are assigned to *Paracytheromorpha* (see C. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and NW France*, unpubl. PhD thesis, Univ. Wales, **1**, 335-345; **2**, pl. 29, figs. 1-30, 1985). ?*Cythere* sp. of Breman (*The distribution of Ostracods in the bottom sediments of the Adriatic Sea*, PhD thesis, Univ. Amsterdam, **48**, pl. 6, fig. 81, 1976), *Cytheromorpha nana* Bonaduce, Ciampo & Masoli, 1975 (*Publ. Staz. zool. Napoli*, **40**, 114, pl. 70, figs. 9-11)

Explanation of Plate 12, 18

Fig. 1, ♀ LV, ext. lat. (holotype, OS 12827, 540 µm long); fig. 2, ♂ LV, ext. lat. (paratype, OS 12828, 560 µm long); fig. 3, ♂ RV, ext. lat. (paratype, OS 12829, 550 µm long). Scale A (200 µm; × 111), figs. 1-3.

Stereo-Atlas of Ostracod Shells 13, 19

Paracytheromorpha rimafoissa (3 of 4)

Remarks: (cont.) and *Ostracoda incertae Genera* of Barbeito-González (*Mitt. hamb. zool. Mus. Inst.*, **67**, 321, pl. 43, figs. 1d, 2d, 1971) are tentatively included in *Paracytheromorpha* on the basis of external morphology; no internal descriptions of these species have been published.

Paracytheromorpha is assigned to the Loxoconchidae because of its external resemblance to *Cytheromorpha* and its possession of sieve-type normal pores and simple, straight radial pore canals. In addition, its muscle scar configuration and hinge structure are not unlike other members of the family. Stratigraphical range: Miocene, Pliocene, ?Pleistocene – Recent.

Paracytheromorpha rimafoissa sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12827, ♀ LV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12828 – OS 12832].

Type locality: Blue Clay, sample no. 29, NW corner of Vicarage Pit, St. Erth, Cornwall, England (Nat. Grid Ref. SW 556352); Upper Pliocene.

Derivation of name: Latin, alluding to the slit-like openings to the fossae.

Figured specimens: British Museum (Nat. Hist.) nos. OS 12827 (holotype, ♀ LV: Pl. 13, 18, fig. 1), OS 12828 (paratype, ♂ LV: Pl. 13, 18, fig. 2), OS 12829 (paratype, ♂ RV: Pl. 13, 10, fig. 3), OS 12830 (paratype, ♂ LV: Pl. 13, 20, figs. 1, 4, 5), OS 12831 (paratype, ♀ juv. LV: Pl. 13, 20, fig. 2), OS 12832 (paratype, ♂ juv. LV: Pl. 13, 20, fig. 3). OS 12830 is from the type locality; OS 12828, OS 12829, OS 12831 and OS 12832 are from the shell rich sands of Le Temple du Cerisier, SW of Rennes, NW France; Redonian, Upper Pliocene.

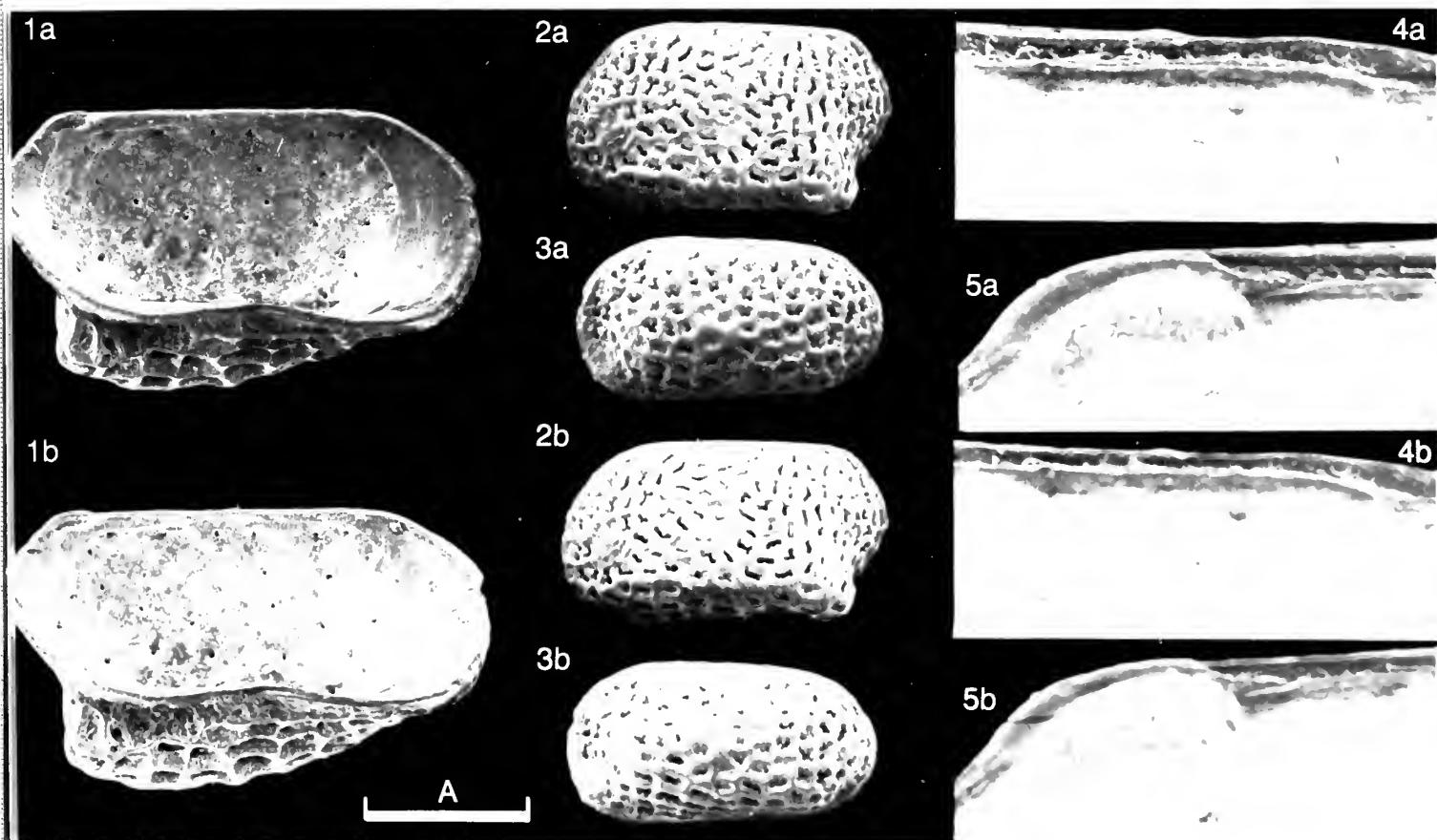
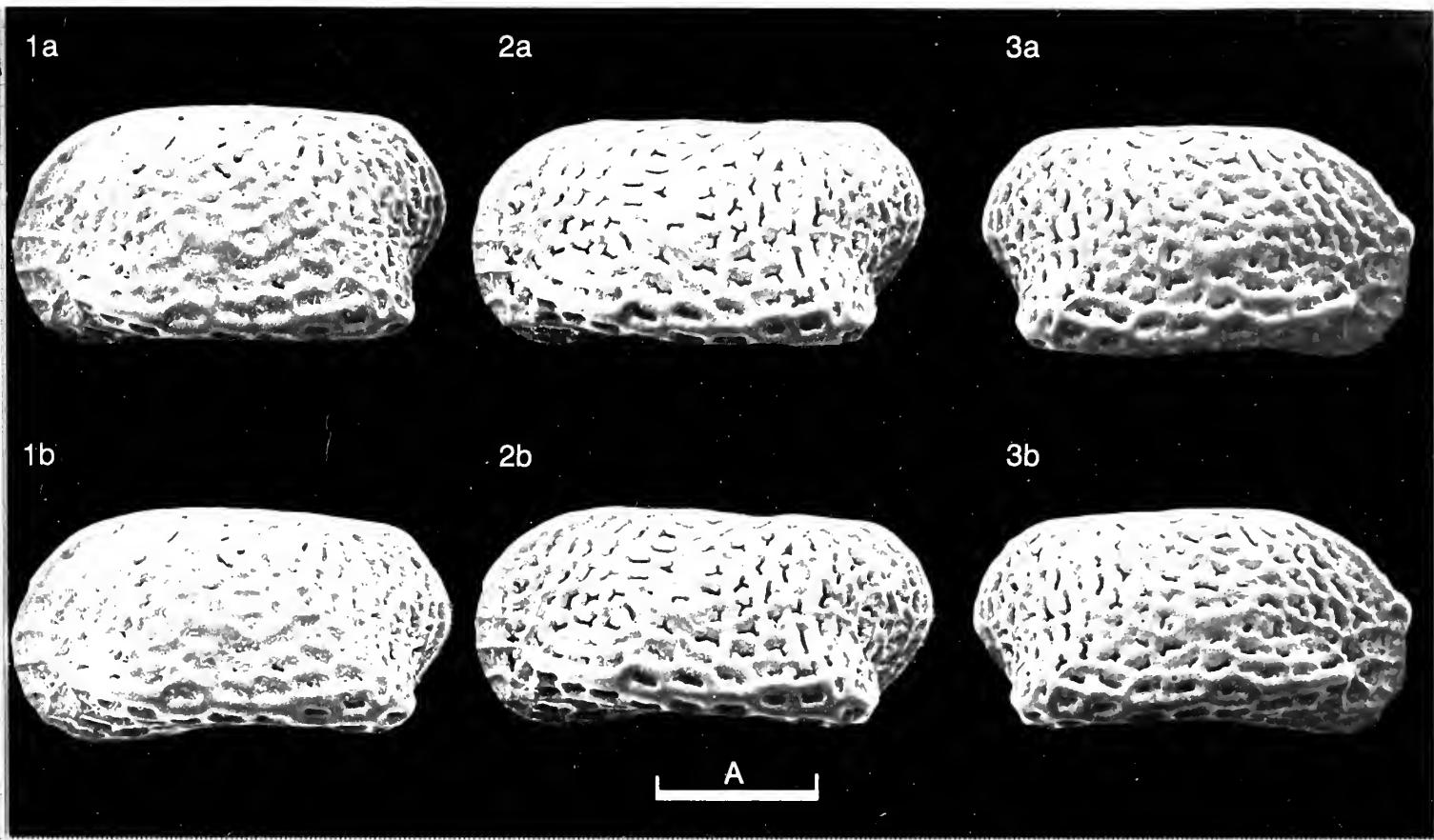
Diagnosis: Medium-sized, subrectangular alaeform *Paracytheromorpha* with a celated, reticulate ornament.

P. rimafoissa is similar to Breman's ?*Cythere* sp. from the Pleistocene to Holocene of the Adriatic (1976, *op. cit.*), but in the latter species the fossae do not have slit-like openings.

Distribution: Upper Pliocene deposits of St. Erth, Cornwall, England (sample nos. 1-4, 7, 14, 16, 18, 21, 23, 25-29; see C. Maybury, *op. cit.*, **1**, 3-6, for sample details) and Redonian deposits of Beugnon (sample no. 2), Le Bosq d'Aubigny and Apigné (Gîte d'Apigné Borehole II, Le Temple du Cerisier) NW France (see J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, **1**, 8-26, 1968 for geographical, stratigraphical and sample details). Juvenile specimens have also been noted by the authors in the Lower Miocene of the Bazadais region, SW France.

Explanation of Plate 12, 20

Figs. 1, 4, 5, ♂ LV (paratype, OS 12830, 590 µm long): fig. 1, int. lat.; fig. 4, ant. hinge element; fig. 5, post. hinge element. Fig. 2, ♀ juv. LV, ext. lat. (paratype, OS 12831, 390 µm long). Fig. 3, ♂ juv. LV, ext. lat. (paratype, OS 12832, 400 µm long). Scale A (200 µm; × 111), figs. 1-3; Scale B (40 µm; × 555), figs. 4, 5.



ON RETINODA SULCATA (KNÜPFER)

by Roger E. L. Schallreuter
(University of Hamburg, Federal Republic of Germany)

Genus *RETINODA* gen. nov.

Type-species: *Ulrichia varionoda sulcata* Knüpfer, 1968

Derivation of name:

Latin *rete*, net and *nodus*, swelling; alluding to the reticulated nodes.

Diagnosis:

Small to medium-sized genus of boliids. Two nodes of different size at the dorsal border; posterior node larger. Valves have an entire pseudovulum. Both the lateral surface and nodes are punctate or reticulate.

Remarks:

Ulrichia Jones (*Q. Jl. geol. Soc. Lond.*, **46**, 543, 1890; type-species: *Ulrichia conradi* from the Devonian of Canada) is similar but differs by its non-reticulate nodes.

Retinoda sulcata (Knüpfer, 1968)

1968 *Ulrichia varionoda sulcata* n.sp., J. Knüpfer, *Freiberger ForschHft.*, (C), **234**, 5, 6, 18, pl. 1, figs. 3, 5.

1970 *Ulrichia varionoda sulcata* Knüpfer; H. Jordan, *Ibid.*, **265**, 8, 29.

Holotype: Geologisches Institut, Bergakademie Freiberg, Sachsen, German Democratic Republic; no. **45/1012**, LV.

Explanation of Plate 13, 22

Fig. 1, LV, ext. lat. (GPIMH 3250, 0.55mm long. Figs. 2, 3, LV (GPIMH 3251, 0.56mm long): fig. 2, ext. dors. obl.; fig. 3, ext. lat. Scale A (100µm; ×120), figs. 1-3.

Type locality:

Bergstollen adit of the Gebersdorf Iron-ore mine, Thuringia, German Democratic Republic; lat. 50° 32'N, long. 11° 17'E; limestone layer in the upper layer of the Upper Ore Horizon (Oberes Lager des Oberen Erzhorizontes = uppermost Caradoc, zone 13), Gräfenthal series (J. Knüpfer, *Ber. geol. Ges. DDR* **10** (2), 203, 1965).

Figured specimens:

Geologisch-Paläontologisches Institut und Museum, University of Hamburg (GPIMH) nos. **3250** (LV: Pl. 13, 22, fig. 1), **3251** (LV: Pl. 13, 22, figs. 2, 3), **3252** (RV: Pl. 13, 24, fig. 1) and **3253** (RV: Pl. 13, 24, figs. 2, 3).

All the figured specimens are from the limestone layer in the Upper Ore Horizon of the former Wittmannsgereuth open-pit iron-ore mine, on the 'Breiten Berg' near Saalfeld, Thuringia, German Democratic Republic (H. Blumenstengel *et al.*, *Geol. Ges. DDR Exkursionsführer Herbsttagung 1963*, 5); lat. 50° 39'N, long. 11° 19.5'E; collected by the author in about 1965. All the material is coarsely silicified; Caradoc Series, Ordovician.

Diagnosis:

Length up to 0.56mm. Nodes relatively large. Between the nodes there is a weak sulcus (sulcal depression). Lateral surface punctate.

Remarks:

Retinoda celebrata (Gailite) (*Palaeont. Stratigr. Baltic Byelorussia* **3**, 45, 1971) is much larger (1.4mm long) and possesses smaller nodes and a reticulate rather than punctate lateral surface.

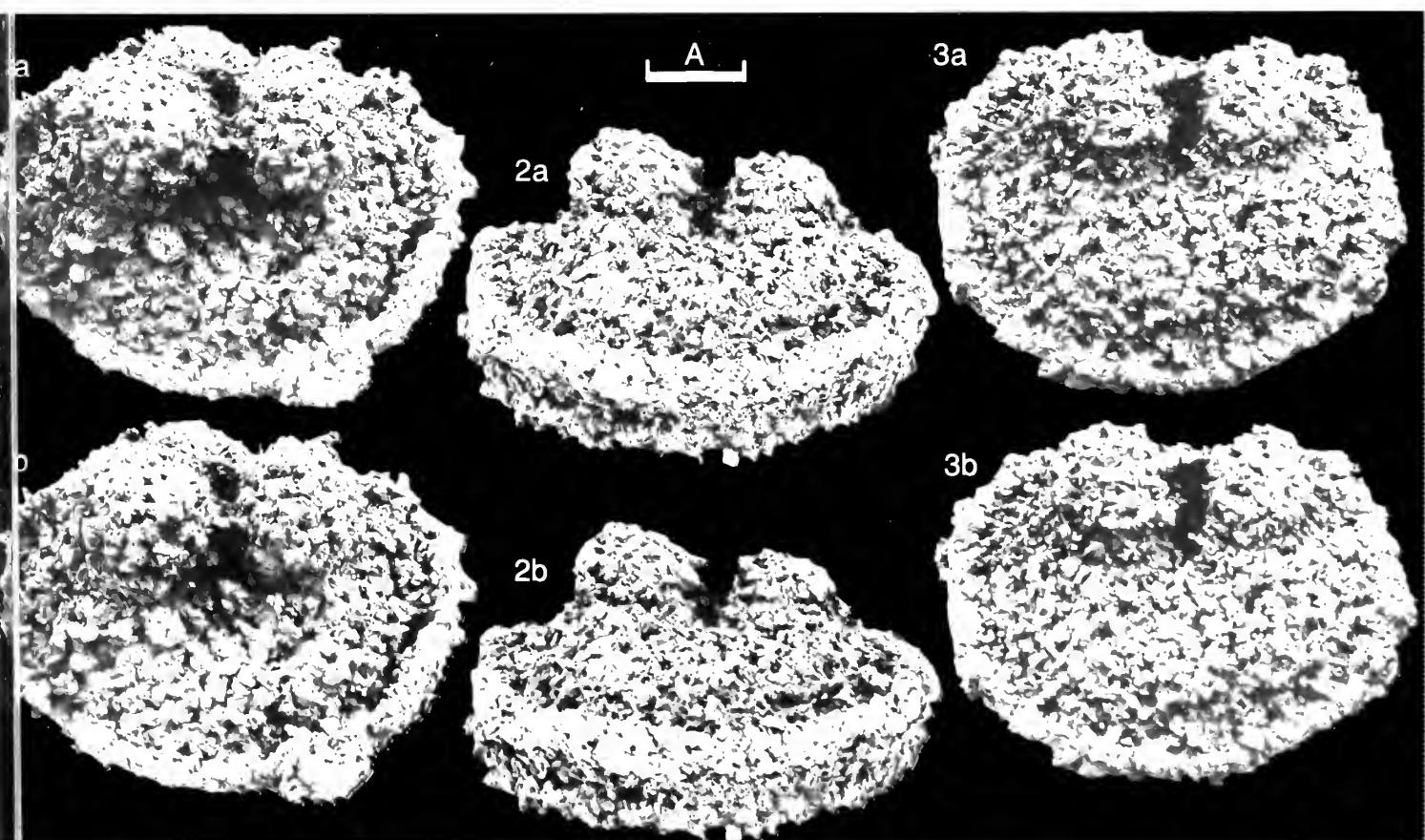
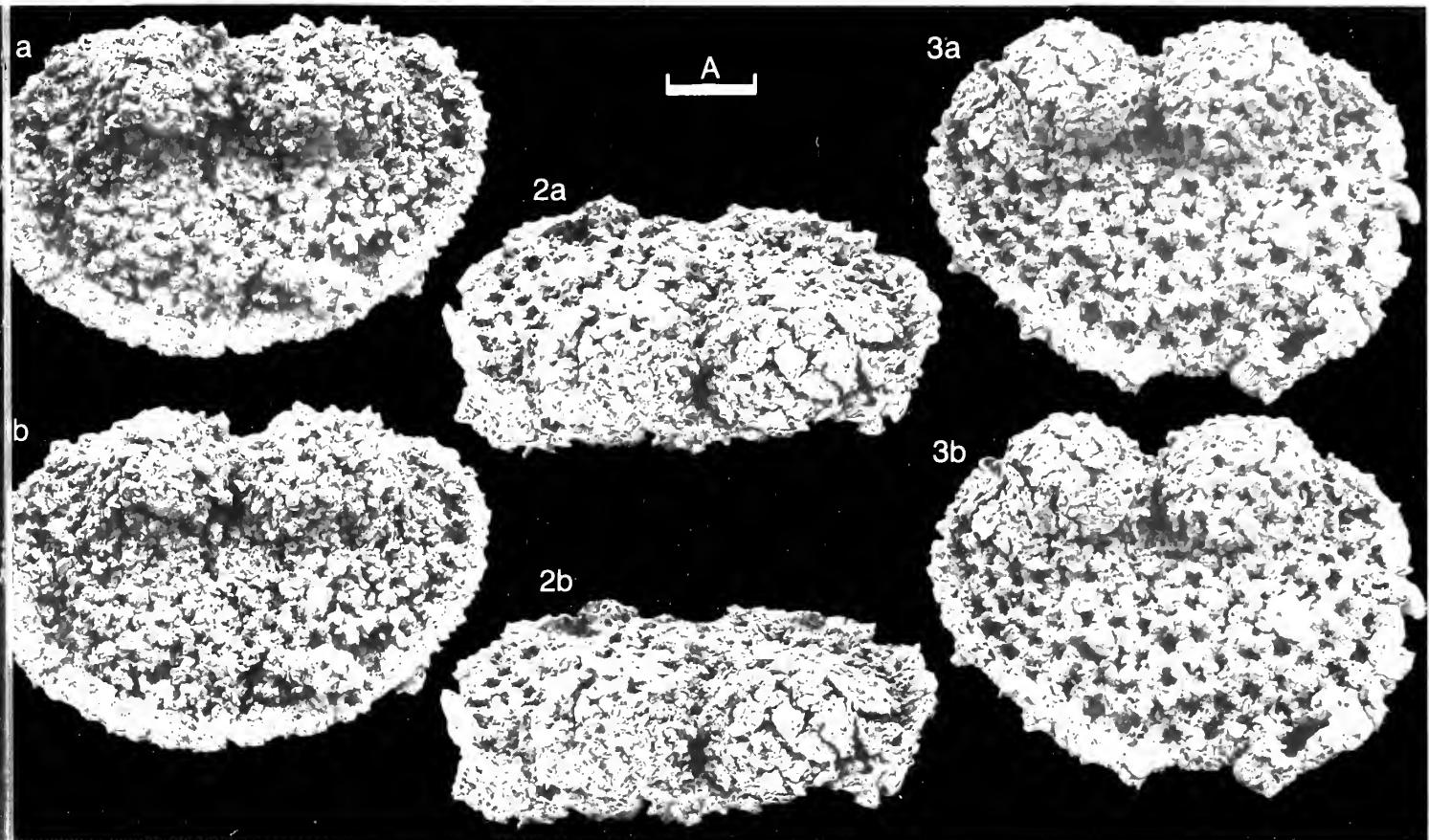
R. sulcata is very similar to, if not conspecific with *Ulrichia varionoda* Blumenstengel (*Freiberger ForschHft.*, (C), **182**, 67, 1965). Knüpfer originally described *R. sulcata* as a subspecies of *U. varionoda* and gave as differences its distinct sulcus and the stronger 'velar' keel. However, the silification is rather coarse and the sulcus so weak (see Pl. 13, 22, figs. 1, 3, Pl. 13, 24, fig. 3) that it is hard to acknowledge Knüpfer's differentiation. However, because *R. varionoda* was established on the basis of only ten valves and, furthermore, from an extremely rare limestone boulder from the slightly younger Lederschiefer (Ashgill), *Ulrichia varionoda sulcata* is proposed as the type-species of the new genus.

Distribution:

Known only from the type stratum in Thuringia, German Democratic Republic; localities as given above. Caradoc Series, Ordovician.

Explanation of Plate 13, 24

Fig. 1, RV, ext. lat. (GPIMH 3252, 0.49mm long. Figs. 2, 3, RV (GPIMH 3253, 0.51mm long): fig. 2, ext. vent. obl.; fig. 3, ext. lat. Scale A (100µm; ×130), figs. 1-3.



ON WEHRLIA OLBERTZAE SCHALLREUTER
by Roger E. L. Schallreuter
(University of Hamburg, Federal Republic of Germany)

Genus WEHRLIA Schallreuter, 1965

1965 *Wehrlia* g.n.; R. Schallreuter, *Ber. geol. Ges. DDR*, **10** (4), 484.

Type-species (by original designation): *Wehrlia olbertzae* Schallreuter, 1965.

Diagnosis: See 'Diagnosis' for the species. The genus is monotypic.

Remarks:

Wehrlia is the type-genus of the subfamily Wehrliinae Schallreuter, 1965 (*op. cit.*), which are quadrilobate to unisulcate ctenomotellids with a specialized, wehrliine antrum. The antrum is formed by a sausage-shaped (botulate) dolon, with a row of peripheral spines having a grill-like appearance. The following genera and subgenera also belong to the subfamily: *Rakverella* Öpik, 1937; *Rakverella (Pectidolon)* Schallreuter, 1966; *Bilobatia* Schallreuter, 1976; *Schallreuteria* Siveter, 1982; *Schallreuteria (Lippea)* Schallreuter, 1984.

Even amongst the wehrliines *Wehrlia* is a very specialized form, with its long flat domicilium and its strong, laterally and posteriorly directed hook-line anterior spine. Perhaps it lived between strands of floating algae and the hook functioned as some form of anchoring device.

Wehrlia olbertzae Schallreuter, 1965

1965 *Wehrlia olbertzae* g.n.sp.n., R. E. L. Schallreuter, *op. cit.*, 479, 484, 485; pl. 11, figs. 2, 3.

1968 *Wehrlia*; R. Schallreuter, *Wiss. Z. Univ. Greifswald, Math.-naturwiss. R.*, **17** (1/2), 127.

1970 *Wehrlia olbertzae*; R. E. L. Schallreuter, *Hercynia, N.F.*, **6** [1969] (3), tab. 2 (292/3).

1973 *Wehrlia olbertzae* Schallreuter; W. Neben & H. H. Krueger, *Staringia*, **2**, pl. 92, fig. 7.

1976 *Wehrlia olbertzae* Schallreuter; R. E. L. Schallreuter, *Palaeontographica*, (A), **153** (4/6), 208, 209.

Explanation of Plate 13, 26

Fig. 1, post. incomplete ♀ LV, ext. lat. (GPIMH 3254, 0.45 mm high excluding spines); fig. 2, post incomplete tecnomorphic RV, ext. lat. (GPIMH 3255, 0.35 mm high excluding spines); fig. 3, ♀ RV, detail of ornament of lat. surface (GPIMH 3256).

Scale A (100µm; × 110), fig. 1; scale B (100µm; × 120), fig. 2; scale C (50µm; × 250), fig. 3.

1978 *Wehrlia olbertzae* Schallreuter; J. Gründel, *Z. geol. Wiss.*, **6** (1), 72.

1982 *Wehrlia olbertzae* Schallreuter; R. E. L. Schallreuter, *Stereo-Atlas Ostracod Shells*, **9** (18), 103.

1983 *Wehrlia olbertzae*, Schallreuter; R. E. L. Schallreuter, *Palaeontographica*, (A), **180** (4/6), 165, 166, 179, pl. 11, fig. 2.

1984 *Wehrlia olbertzae* Schallreuter; R. E. L. Schallreuter, *N. Jb. Geol. Paläont. Abh.*, **169** (1), 4.

Holotype: Sektion Geologische Wissenschaften, University of Greifswald, German Democratic Republic; no. 15/6, dorsally and ventrally incomplete ♀ RV.

Type locality: Teschenhagen, S. of Stralsund, German Democratic Republic; lat. 54° 15'N, long. 13° 8'E. Backsteinkalk erratic boulder no. and type 14B2 (of Schallreuter collection); equivalent of the Idavere (C₃) or Jõhvi stage (D₁) of Estonia, lower Upper Viruan, middle Ordovician.

Figured specimens: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (GPIMH) nos. 3254 (♀ LV: Pl. 13, 26, fig. 1), 3255 (tecnomorphic RV: Pl. 12, 26, fig. 2), 3256 (♀ RV: Pl. 13, 26, fig. 3, Pl. 13, 28, fig. 1) and 3257 (tecnomorphic RV: Pl. 13, 28, fig. 2).

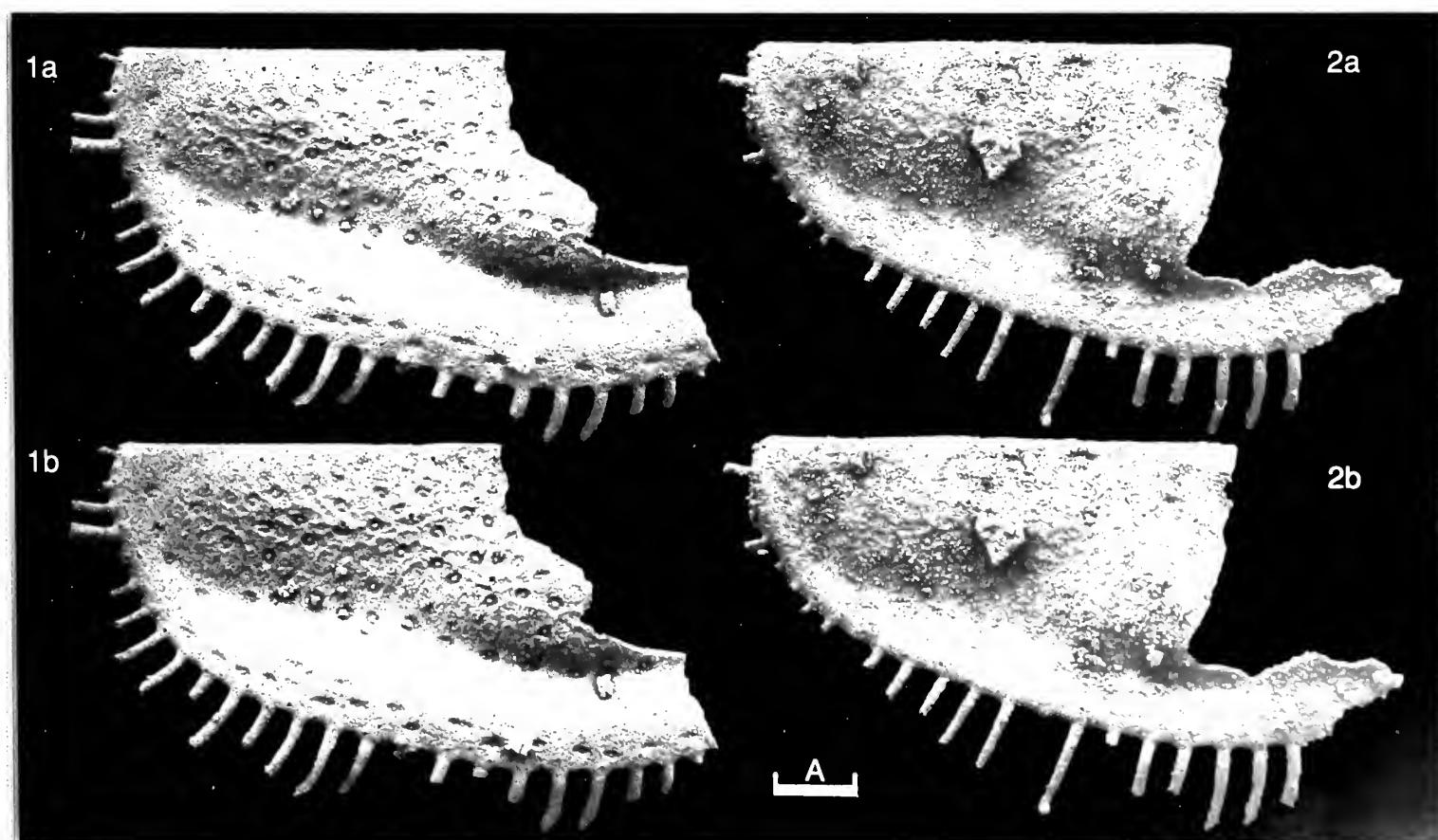
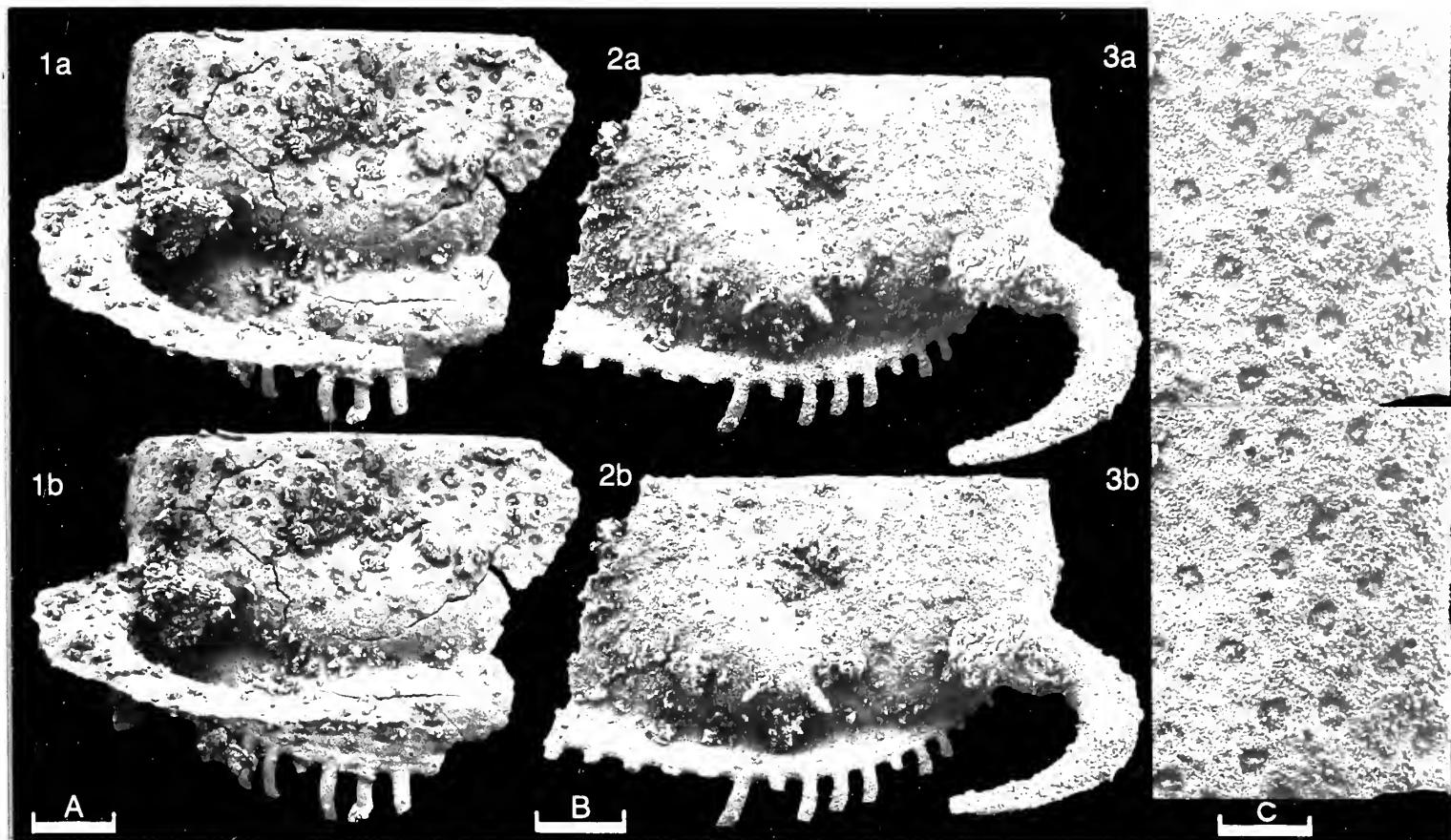
All from 14B2-type Backsteinkalk erratic boulder no. Lip 1 (of Schallreuter collection). From the beach at Lippe, Hohwacht Bay, Baltic Sea, Germany; lat. 54° 18'N, long. 10° 38.5'E. Boulder collected by the author in July 1983.

Diagnosis: Adults c. 0.96mm long. Valves very long (L:H > 2.05). Free margin ventrally concave. Quadrilobate, but with only one distinct sulcus (S2) which is long and sigmoidal. All lobes rather flat. L1 broad, occupying nearly the whole anterior field; has a very long, anteroventral, posteriorly directed hook-like spine. L2 a low, oval node. L3 kidney-shaped, separated from L4 by a semisulcus. L4 occupying the posterior part of posterior field, lower than L3. Velar flange extends from below the base of the anteroventral spine up to the posterior cardinal corner; has peripheral, long spines. Velar dolon ventrally broader than tecnomorphic flange and weakly convex. Lateral surface with broad puncta, each with a small, central tubercle. Puncta on dolon elongate; dolon striated parallel to margin.

Distribution: Known only from lower Upper Viruan Backsteinkalk erratic boulders (types 14B2 and 1B13 of Schallreuter collection), northern Germany and the Isle of Gotland (Sweden); middle Ordovician.

Explanation of Plate 13, 28

Fig. 1, ant. incomplete ♀ RV, ext. lat. (GPIMH 3256, 0.42 mm high excluding spines); fig. 2, ant. incomplete tecnomorphic RV, ext. lat. (GPIMH 3257, 0.42 mm high excluding spines). Scale A (100µm; × 110), figs. 1, 2.



ON BEYRICHIA (ALTIBEYRICHIA) KIAERI HENNINGSMOEN

by Paul D. Pollicott
(University of Leicester, England)

Beyrichia (*Altibeyrichia*) kiaeri Henningsmoen, 1954

- 1954 *Beyrichia (Beyrichia) kiaeri* sp.n. G. Henningsmoen, *Norsk. geol. Tidsskr.*, **34**, 43, pl. 3, fig. 13 (non 14, 15), pl. 8, fig. 8.
1957 *Beyrichia kiaeri* Henningsmoen, 1954; R. V. Kesling & K. J. Rogers, *J. Paleont.*, **31**, 999.
1957 *Beyrichia kiaeri* Henningsmoen; R. V. Kesling, *Contr. Mus. Paleont. Univ. Mich.*, **14**, 62, pl. 5, figs. 1-3.
1962 *Beyrichia (Altibeyrichia) kiaeri* Henningsmoen, 1954; A. Martinsson, *Bull. geol. Instn Univ. Uppsala*, **41**, 293.

Holotype: Paleontologisk Museum, Oslo, Norway, PMO S2789; ♂ LV.

Type locality: Langøya, Holmestrand, Norway; Steinsfjorden Formation, Wenlock Series, Silurian. Etage 9c of Kiaer (1908, *Vidensk.-selsk Skr.l.Math.-Natur.klasse*. 1906, II, 596 pp.). See Worsley, D. (Ed.), *Nor. geol. unders.* **384**, 1, 1983).

Figured specimens: Paleontologisk Museum, Oslo, nos. PMO 113.503 (♀ RV: Pl. 13, 30, figs. 1-3), PMO 113.504 (♂ LV: Pl. 13, 30, fig. 4), PMO 113.505 (♂ RV: Pl. 13, 32, Fig. 1), PMO 113.506 (♂ LV: Pl. 13, 32, figs. 2-4).

All specimens are from the type locality and horizon; approx. 59° 30'N, 10°15'E. Collected by the author.

Explanation of Plate 13, 30

Figs. 1-3 ♀ RV (PMO 113.503, 2.32 mm long): fig. 1, ext. lat; fig. 2, ext. lat. obl; fig. 3, ext. vent. Fig. 4, ♂ LV, ext. lat. (PMO 113.504, 2.12 mm long).

Scale A (400 µm; × 26), figs. 1, 2; scale B (430 µm; × 24), fig. 3; scale C (355 µm; × 28), fig. 4.

Diagnosis: *Beyrichia (Altibeyrichia)* species with entire, nearly isolate anterior lobe connected by low ridge to both the preadductor lobe and syllobium. Lobes elevated. Anterior syllobial cusp prominent, posterior cusp generally well developed. Syllobium somewhat ridge-like anteriorly, less elevated posteriorly. Anteroventral depression prominent. Velar spines well developed anteroventrally in tecnomorphs. Valves finely granulose, with spare verrucae.

Remarks: The two other described species of the subgenus are *B.(A.) contracta* Martinsson, 1962 and *B.(A.) altiplancta* Martinsson, 1962, from the Wenlock Series of Gotland. *B.(A.) kiaeri* is closest to *B.(A.) contracta* in having a similar spinose velum and anteroventral depression, but differs by lacking a postcruminal wing-like velar flange, its apparent lack of a calcarine spine in tecnomorphs, by its more pronounced syllobial cusps and in having an undivided anterior lobe.

B.(A.) kiaeri differs from the type-species, *B.(A.) altiplancta*, in having a more strongly developed anteroventral depression and lobal connection to the preadductor lobe and also by lacking an isolated cuspidal region to the anterior lobe.

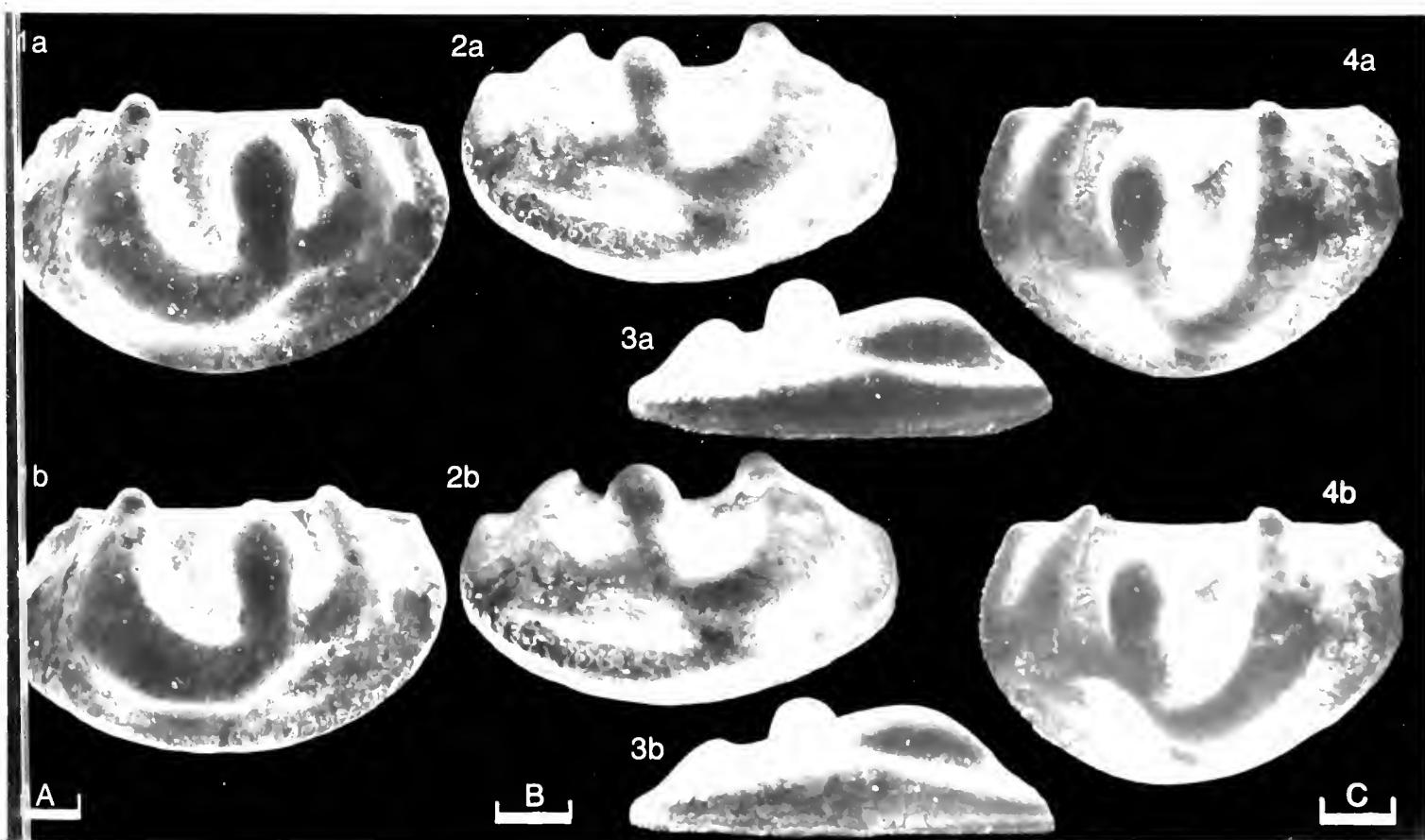
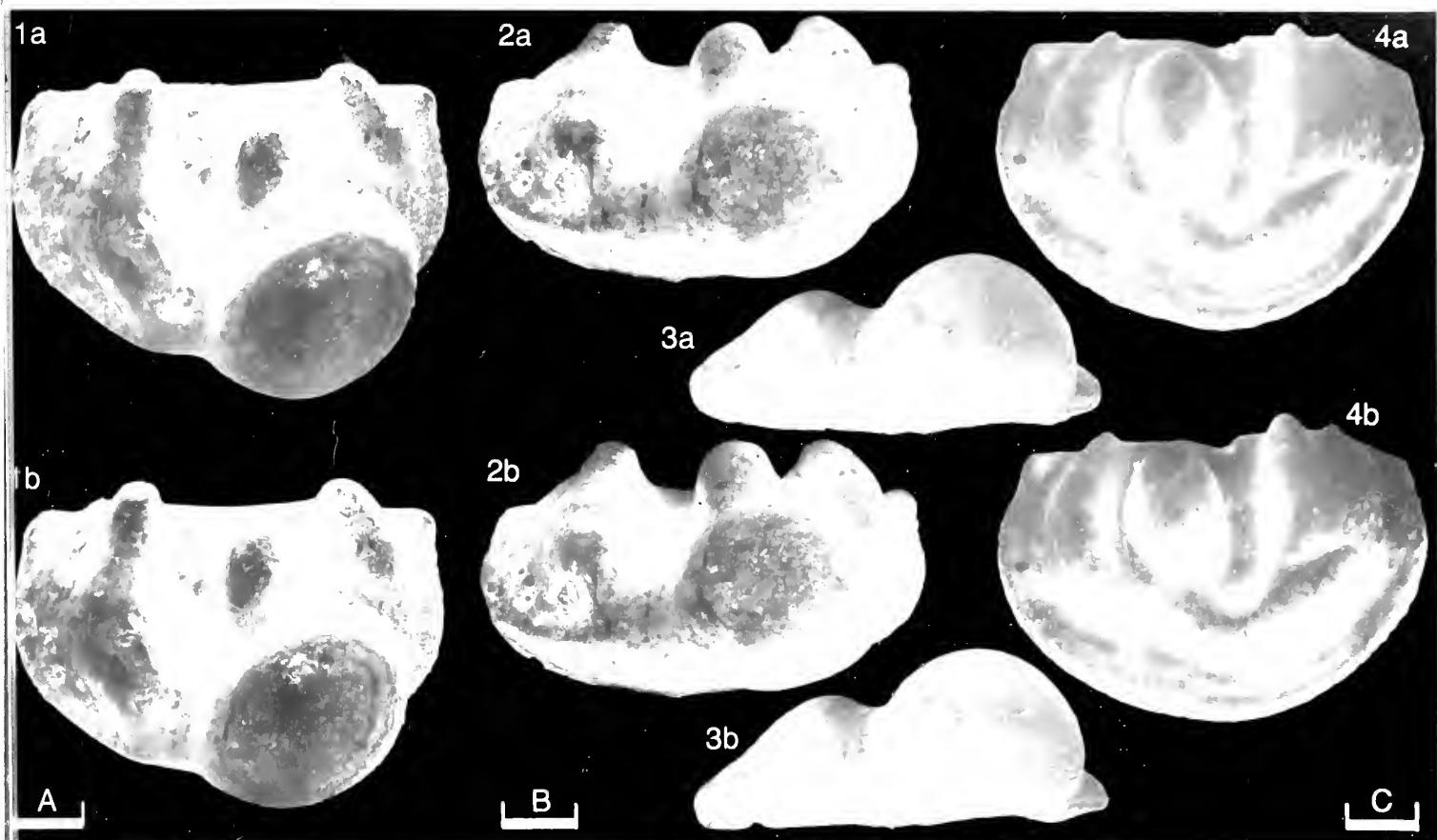
A trend towards the isolation and lobulation of the anterior lobe can be traced in *Beyrichia (Altibeyrichia)*. *B.(A.) kiaeri* shows an entire, well connected anterior lobe. In *B.(A.) contracta* the lobe is more isolated and appears to have a weak anteroventral lobule (Martinsson 1963, fig. 159). *B.(A.) altiplancta* shows total isolation of the cuspidal part of the anterior lobe above a comparatively flattened anteroventral region (Martinsson 1962, fig. 161).

Distribution: *B.(A.) kiaeri* is known only from the Wenlock Series, lower Silurian of the Oslo region, Norway, where it has been collected from many localities and horizons; 9cα to 9cγ in Holmestrand and 9b to 9e in Ringerike. Henningsmoen reported the species from 8b at Ringerike (top Llandovery), but two of his figured specimens from that locality (1954 op.cit., pl. 3, figs. 14, 15) are not conspecific and are determined as *Beyrichia* sp. (Pollicott in prep.).

Explanation of Plate 13, 32

Fig. 1, ♂ ext. lat. slightly obl. (PMO 113.505, 2.00 mm long). Figs. 2-4, ♂ LV (PMO 113.506, 1.84 mm long): fig. 2, ext. lat. obl.; fig. 3, ext. vent; fig. 4, ext. lat.

Scale A (325 µm; × 31), fig. 1; scale B (310 µm; × 33), figs. 2, 3; scale C (310 µm; × 33), fig. 4.



ON AURILA WOUTERSI HORNE sp. nov.

by David J. Horne
(City of London Polytechnic, England)

Aurila woutersi sp. nov.

- 1973 *Aurila convexa* (Baird); K. Wouters, *Revue Micropaléont.*, **16**, pl. 2, fig. 2.
1982 *Aurila convexa* (Baird), form B.; D. J. Horne, *J. micropalaeontol.*, **1**, pl. 1, fig. 14.
Holotype: British Museum (Nat. Hist.) no. **1986.4**, female right and left valves.
[Paratypes: nos. **1986.5**, carapace, **1986.6**, carapace, **1986.7**, right and left valves; all female.]
Type locality: On the S shore of the Bristol Channel at Gore Point, Porlock, Somerset, W England; approx. lat. 51° 14' N, long. 3° 37' W; Recent.
Derivation of name: After Dr. K. Wouters, Brussels; in recognition of his contribution to the study of the Ostracoda.

Explanation of Plate 13, 34

Fig. 1, ♀ RV, ext. lat. (holotype, **1986.4**, 710 µm long); fig. 2, ♀ car., dors. (paratype, **1986.5**, 760 µm long); fig. 3, ♀ LV, ext. lat. (holotype, **1986.4**, 710 µm long).
Scale A (100 µm; × 85), figs 1-3.

- Figured specimens*: British Museum (Nat. Hist.) nos. **1986.4** (holotype, ♀ RV: Pl. **13**, 34, fig. 1; LV: Pl. **13**, 34, fig. 3), **1986.5** (paratype, ♀ car.: Pl. **13**, 34, fig. 2), **1986.7** (paratype, ♀ LV: Pl. **13**, 36, fig. 1; RV: Pl. **13**, 36, fig. 3), **1986.6** (paratype, ♀ car.: Pl. **13**, 36, fig. 2).
All collected alive, by the author, from intertidal algae at the type locality on 9th March, 1978; **1986.4** and **1986.7** from *Corallina*, **1986.5** and **1986.6** from *Laminaria* holdfasts; salinity 31.7 o/oo, water temperature 9.0°C.

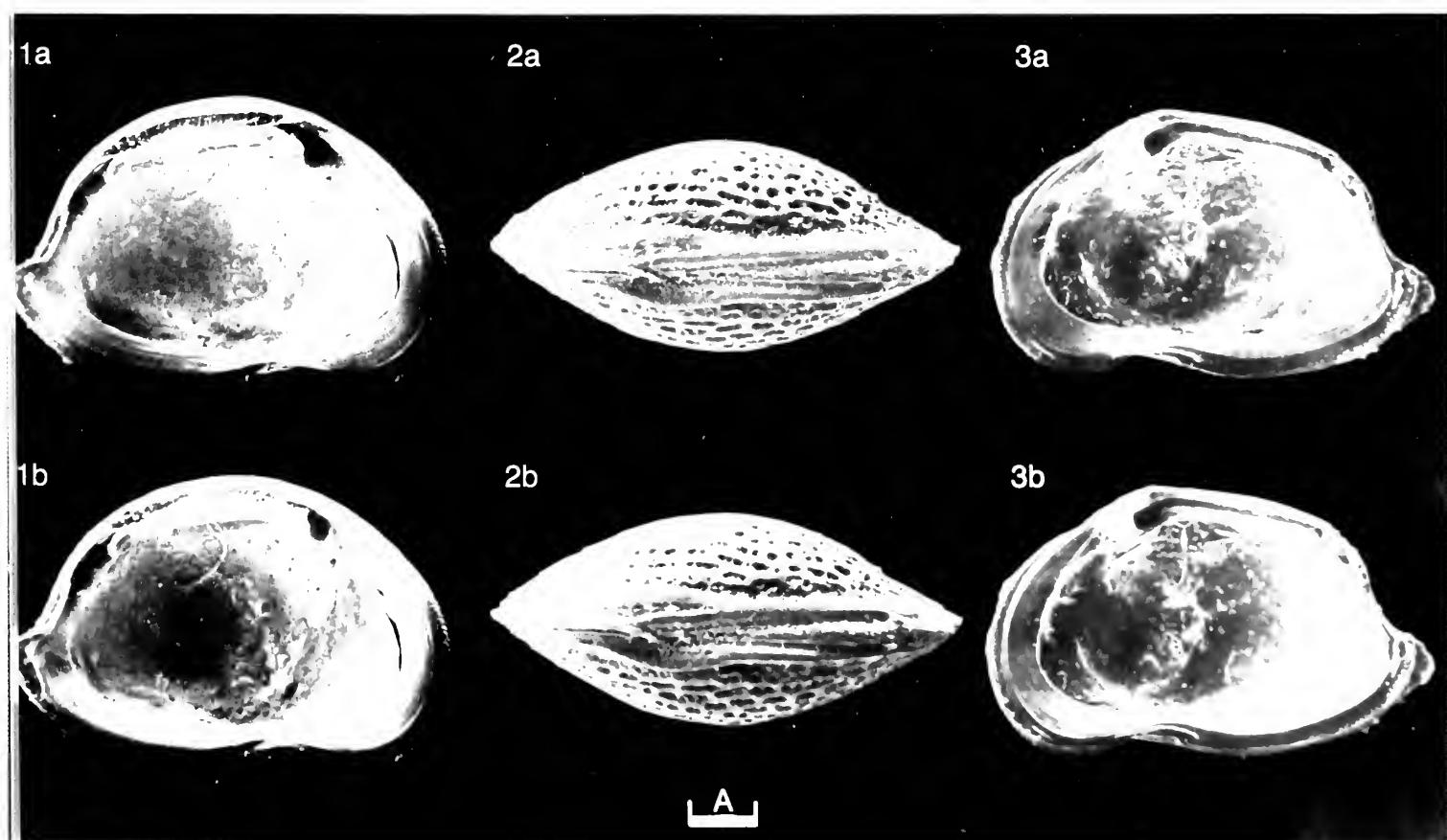
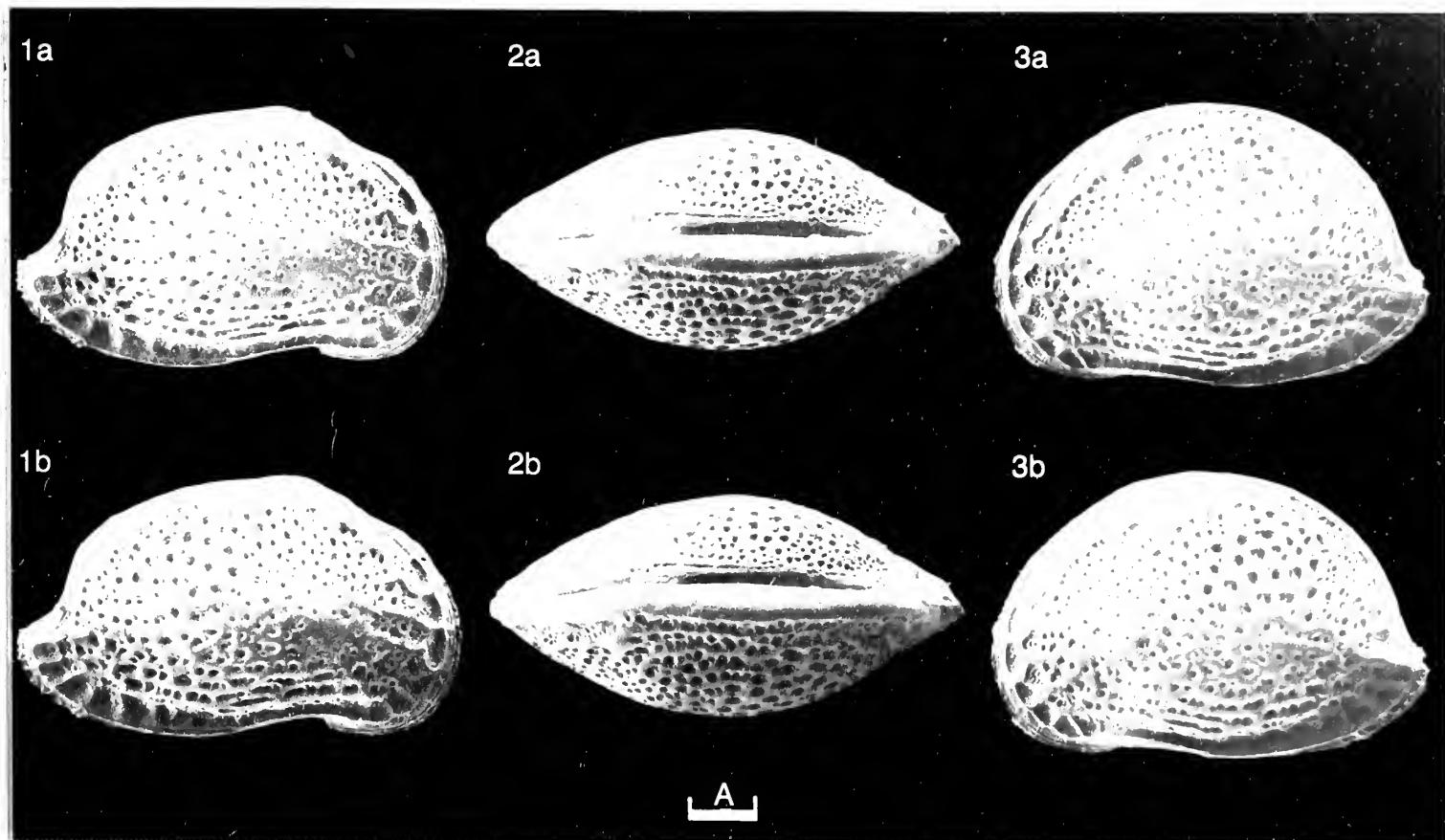
Diagnosis: A subquadrate species of *Aurila* with an evenly arched dorsal margin. Valves ornamented with small, rounded fossae, with primary and secondary reticulation developed around the anterior and posterior margins. Opaque areas: central patch rather quadrate, with branching connections from its posterodorsal corner to the dorsal and posterodorsal margin; anterodorsal patch rounded, posterior patch small, rounded. Living specimens pale green in colour.

Remarks: The occurrence of two distinct forms of *Aurila convexa* (Baird, 1850) s.l. in NW European waters was noted by the author in his ecological study of phytal ostracods at Gore Point in the Bristol Channel (Horne 1982, *op.cit.*): 'form A' is now considered to represent *A. convexa* s.s. (see Doruk, *Stereo-Atlas Ostracod Shells*, **1**, 129-136, 1973), while 'form B', illustrated under the name of *A. convexa* by at least one other author (Wouters 1973, *op.cit.*), is described herein as a new species. The two species are most easily distinguished by comparison of their left valves; that of *A. woutersi* is more quadrate, while that of *A. convexa* is subtriangular with a distinct angle at the highest point of its dorsal margin. Other differences may be noted in surface ornament, shape of opaque areas and colour in living specimens (*A. convexa* is yellow/brown, *A. woutersi* is green).

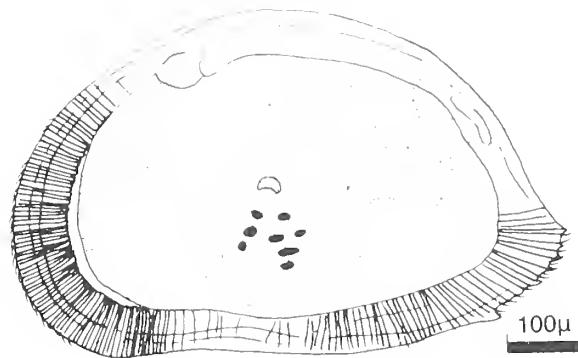
The three Recent British species of *Aurila*, namely *A. woutersi*, *A. convexa* and *A. arborescens* (Brady, 1865) [= *A. woodwardii* (Brady, 1868); see Athersuch, *Stereo-Atlas Ostracod Shells*, **7**, 45-52, 1980, and Athersuch *et al.*, *J. micropalaeontol.*, **4**, 153-158, 1985], are assumed to be parthenogenetic in British waters since no males have been found. However, males of *A. convexa* and *A. arborescens* are known from the Mediterranean. As yet there are no records of *A. woutersi* outside the British Isles.

Explanation of Plate 13, 36

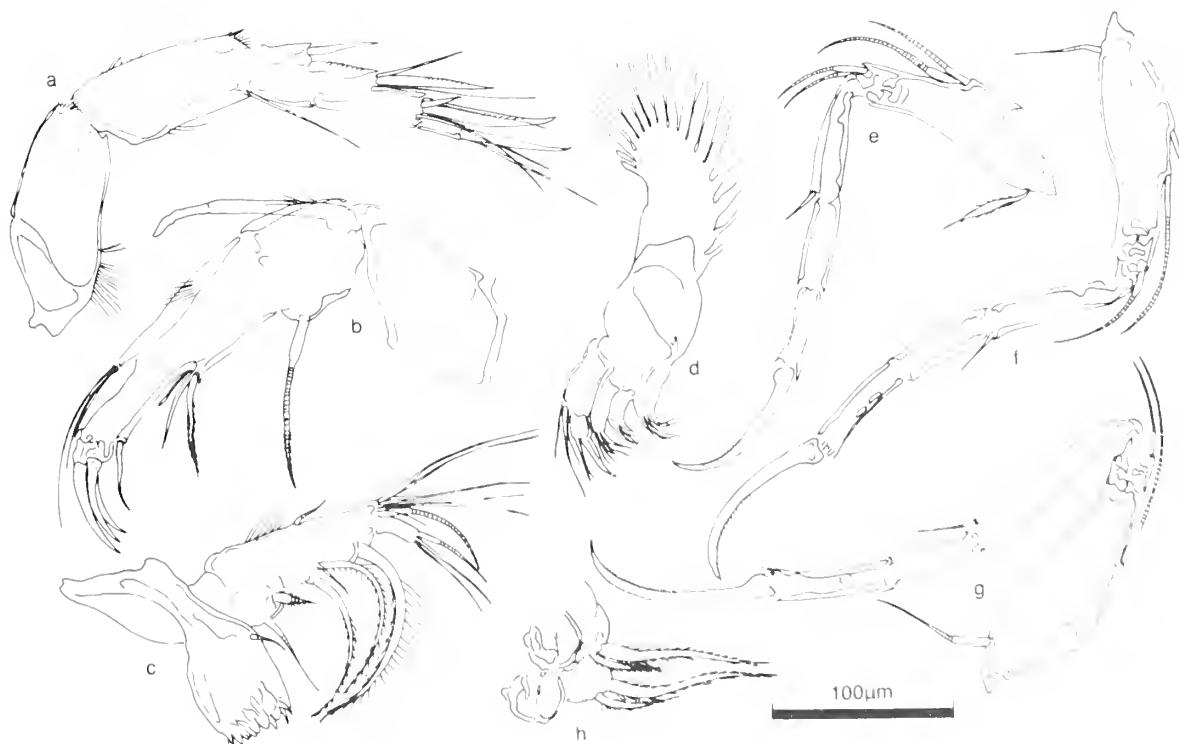
Fig. 1, ♀ LV, int. lat. (paratype, **1986.7**, 720 µm long); fig. 2, ♀ car., vent. (paratype, **1986.6**, 750 µm long); fig. 3, ♀ RV, int. lat. (paratype, **1986.7**, 720 µm long). Scale A (100 µm; × 85), figs. 1-3.



Distribution: Recent: marine, phytal, littoral and shallow sublittoral. British Isles. *A. woutersi* has previously been confused with *A. convexa* and records of the latter species need to be re-examined. At the type locality of *A. woutersi* both species are common members of phytal intertidal faunas. In addition, I have seen specimens of both species in collections from the southern British localities of Weymouth Bay, Swanage and the Thames Estuary.



Text-fig. 1. *Aurila woutersi*, ♀ LV, ext. lat., seen in transmitted light; opaque areas stippled. (Based on the study of more than one specimen).



Text-fig. 2. *Aurila woutersi*, ♀ appendages (based on the study of more than one specimen): a, antennula; b, antenna; c, mandible; d, maxillula; e, first leg; f, second leg; g, third leg; h, furcae and genital lobes.

ON VEENIA (NIGERIA) NIGERIENSIS REYMENT

by Richard Reymont & Eva Reymont
(Department of Historical Geology & Palaeontology, University of Uppsala, Sweden)

Genus *VEENIA* Butler & Jones, 1957

Subgenus *NIGERIA* Reymont, 1963

Type-species: (by original designation): *Veenia nigeriensis* Reymont, 1960.

1963 *Nigeria* subgen. nov. R. Reymont, *Stockh. Contr. Geol.* **10**, 186.

Diagnosis: Ovoid to subtrianguloid carapaces, relatively large, with a pointed to bluntly rounded posterior and smoothly rounded anterior margin. Species are highly polymorphic with respect to shape and ornament; morphs may be smooth, punctate or subreticulate. Shape polymorphism is manifested mainly in the posterior outline and the prominence of the hinge-ear. All morphological variants can occur in the same population and are therefore not ecophenotypic in nature. The anterior and posterior margins bear varying numbers of denticles. There is usually a broad sulcus posterior of the prominent eye-tubercle. The eye-socket is well developed. Inner margin and line of concrecence usually coincident, but there may be a shallow vestibule in left valves. Sexual dimorphism fairly strong with males longer and somewhat lower, on the average, than females; there is overlap in the univariate distributions for carapace measurements and dimorphism can only be completely resolved by multivariate statistics. Hinge variably paramphidont. Anterior marginal pore canals straight and numerous. Posterior marginal pore canals largely concentrated in posteroventral zone where they are numerous. Four vertically aligned adductor muscle scars and a v-shaped frontal scar. Prominent adductorial tubercle almost always found.

Explanation of Plate 13, 40

Fig. 1, ♀ car., rt. lat., regularly reticulate morph (PMAf986, 910 µm long); fig. 2, juv.? car., rt. lat. irregularly ornamented morph with pointed posterior (PMAf987, 1010 µm long); fig. 3, ♀ car., oblique dors., regularly reticulate morph (PMAf982, 910 µm long). Scale A (200 µm; × 60), figs. 1-3.

Distribution: Late Cenomanian of Algeria and Morocco; "Senonian" of Senegal; Campanian to early Paleocene of Nigeria, Cameroun, and Ghana.

Veenia (Nigeria) nigeriensis Reymont, 1960

1960 *Veenia nigeriensis* sp. nov. R. Reymont, *Stockh. Contr. Geol.*, **7**, 169, pl. 11, figs. 1, 1-c, pl. 16, figs. 1-3, pl. 17, figs. 1-3, fig. 56.

1963 *Veenia (Nigeria) nigeriensis* Reymont; R. Reymont, *Stockh. Contr. Geol.*, **10**, 186.

Holotype: Geological Department, University of Stockholm, specimen no. GIO 84/5.

Type locality: Subsurface of western Nigeria (Araromi borehole), approx. lat. 06° 35' N, long. 04° 55' E; Araromi Shale, late Maastrichtian, Cretaceous.

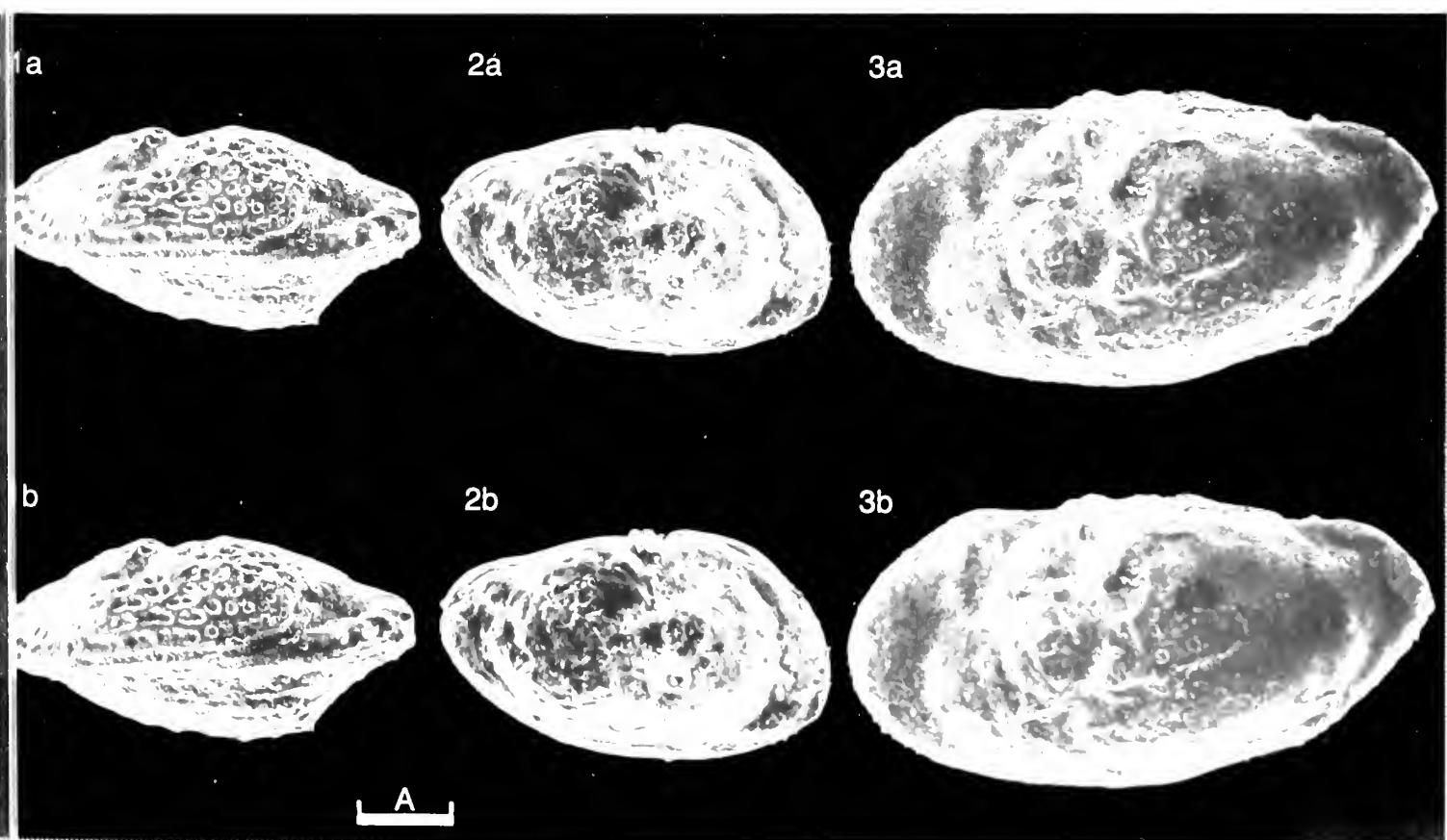
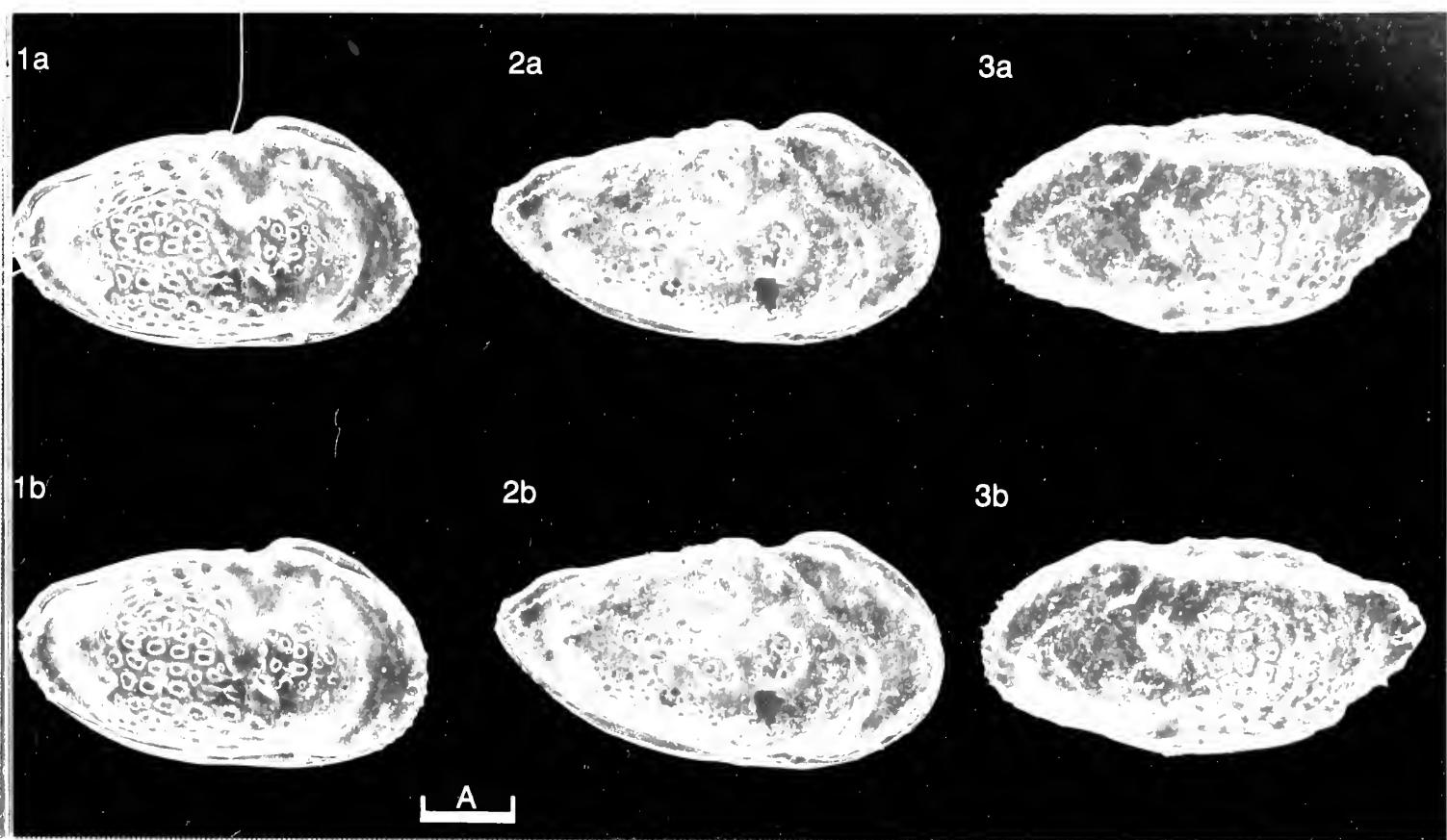
Figured specimens: Palaeontological Museum, University of Uppsala, Sweden, nos. PMAf979 (RV: Pl. 13, 44, fig. 1; Pl. 13, 46, fig. 1), PMAf980 (LV: Pl. 13, 44, fig. 3), PMAf981 (LV: Pl. 13, 46, fig. 2), PMAf982 (♀ car.: Pl. 13, 40, fig. 3; Pl. 13, 42, fig. 1), PMAf983 (♀ car.: Pl. 13, 42, fig. 2), PMAf984 (♂ car.: Pl. 13, 42, fig. 3), PMAf985 (LV: Pl. 13, 44, fig. 2), PMAf986 (♀ car.: Pl. 13, 40, fig. 1), PMAf987 (juv.? car.: Pl. 13, 40, fig. 2) and PMAf992 (♀ car.: Pl. 13, 46, fig. 3).

All from the Gbekebo 1 borehole, western Nigeria (drilled by the Shell D'Arcy Petroleum Exploration Company), from the Campanian? – Maastrichtian Araromi Shale at the following depths (in feet): 2963 (PMAf987), 2969 (PMAf981), 3126 (PMAf984), 3209 (PMAf979; PMAf980), 3265 (PMAf982; PMAf985), 3271 (PMAf983) and 3274 (PMAf986; PMAf992).

Explanation of Plate 13, 42

Fig. 1, ♀ car., oblique vent., regularly reticulate morph (PMAf982, 960 µm long); fig. 2, ♀ car., rt. lat. laterally smooth morph (PMAf983, 880 µm long); fig. 3, ♂ car., lt. lat., smooth morph (PMAf984, 1330 µm long).

Scale A (200 µm; × 60), figs. 1-3.



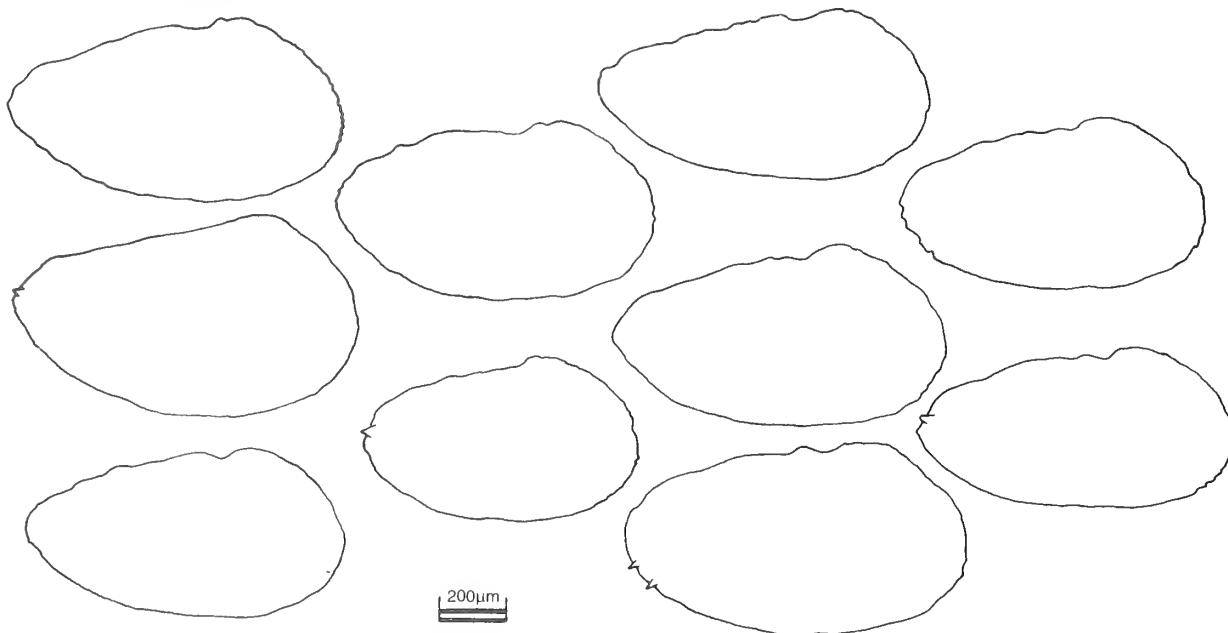
Diagnosis: Highly polymorphic (mode of reticulation; shape of posterior; laterally smooth or punctate). Strong sexual dimorphism in size and shape; dorsal margin almost straight in males, slightly arched in females. Strong adductor tubercle. Carapace with or without obscure lateral bulges. Rounded eye tubercle. Variable denticulation of anterior and posterior margins. Lateral pores often countersunk. Hinge variable, paramphidont.

Distribution: Maastrichtian and possibly also the late Campanian of West Africa (Ghana, Bénin, Nigeria and Cameroun). Reworked specimens are common in the Paleocene of Cameroun and coastal Nigeria.

Explanation of Plate 13, 44

Fig. 1, RV, int. lat., showing hinge (PMAf979); fig. 2, LV, ext. lat. lateral pore (PMAf985); fig. 3, LV, int. lat., showing hinge (PMAf980).

Scale A (200 μm ; $\times 120$), figs. 1-3; scale B (5 μm ; $\times 1200$), fig. 2.

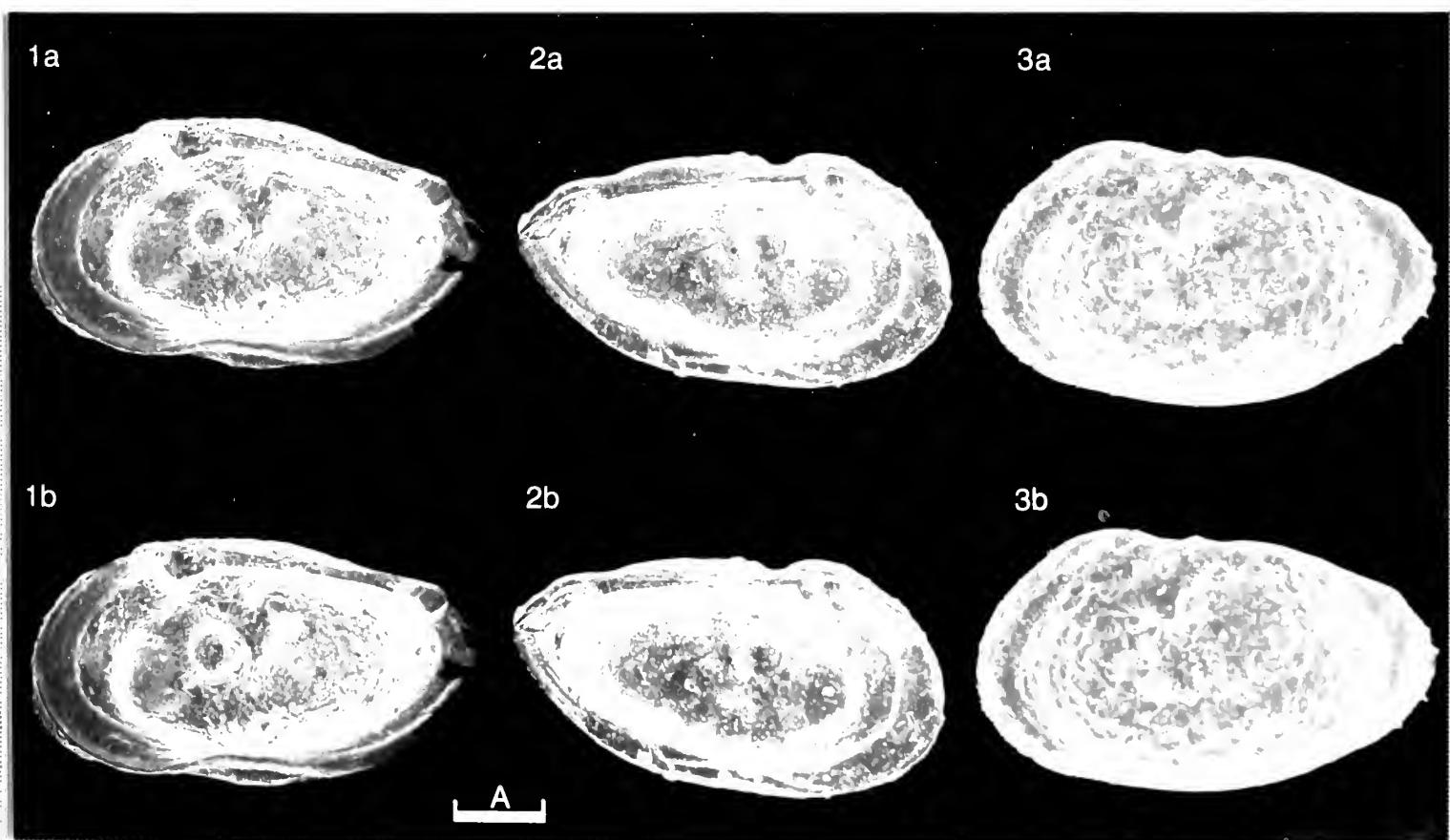
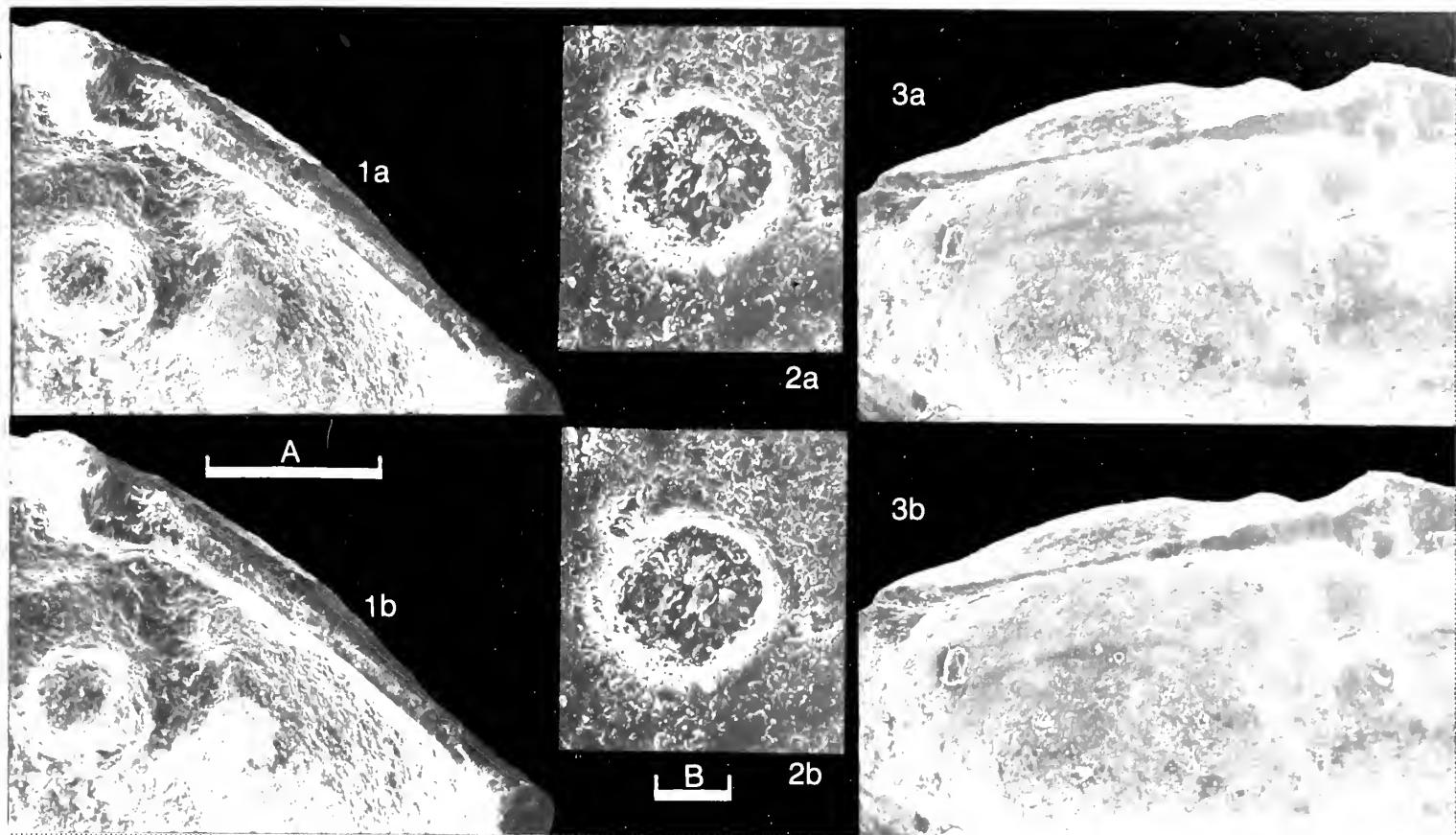


Text-fig. 1. Outlines of carapaces of *Veenia nigeriensis* showing variation in shape. All are mature individuals (from a number of different populations), the size differences resulting from ecophenotypic factors.

Explanation of Plate 13, 46

Fig. 1, RV, int. lat., (PMAf979, 1050 μm long); fig. 2, LV, int. lat., (PMAf981, 1000 μm long); fig. 3, ♀? car., lt. lat., irregularly reticulate morph (PMAf992; 1050 μm long).

Scale A (200 μm ; $\times 60$), figs. 1-3.



ON BAIRDIA JAMMUENSIS SINGH & TEWARI

by Pratap Singh
(33 Khur Bura, Dehra Dun, India)

Bairdia jammuensis Singh & Tewari, 1966

1966 *Bairdia jammuensis* sp. nov. P. Singh & B. S. Tewari in: B. S. Tewari & P. Singh, *Cent. Advan. Study in Geology, Panjab University, Chandigarh*, 3, 119, pl. 1, figs. 3a-d.

Holotype: University of Lucknow, India, coll. no. L.U. 212.

[*Paratype:* L.U. 213].

Type locality: Sample 22; dark grey, fossiliferous, argillaceous limestone of the Kalakot Formation, Subathu Group, late early Eocene. About 150 feet above road level in a cliff on the western side of the road leading to Gua from Beragua and situated at a distance of about 800 feet S15° W from the opening of the Beragua Mine in the Kalakot Coalfield (Survey of India topographic sheet 43K/8), Nawshera and Rajouri Tehsils of Poonch District, Jammu and Kashmir State, India (see Neale & Singh, *Stereo-Atlas Ostracod Shells*, 11, 139, text-fig. 1, 1984).

Figured specimens: University of Lucknow nos. L.U. 212 (holotype, car.: Pl. 13, 48, figs. 1, 2; Pl. 13, 50, figs. 2, 3), L.U. 213 (paratype, car.: Pl. 13, 50, fig. 1). Both from the type locality and horizon.

Explanation of Plate 13, 48

Fig. 1, 2. car. (holotype, L.U. 212, 940 µm long); fig. 1, rt. lat.; fig. 2, lt. lat.
Scale A (200 µm; × 104), figs. 1, 2.

Diagnosis: Carapace elongate; dorsal margin arched, ventral margin straight; anterior end rounded in ventral half and angularly rounded in dorsal half; posterior end blunt; anterior side broader than posterior; left valve larger and overlaps the right valve along dorsal, mid-ventral, some parts of posteroventral and anteroventral margins, length twice the height, highest in middle; in dorsal and ventral views lateral outline moderately convex with posterior end more compressed than anterior end, dorsal and ventral margin slightly curved.

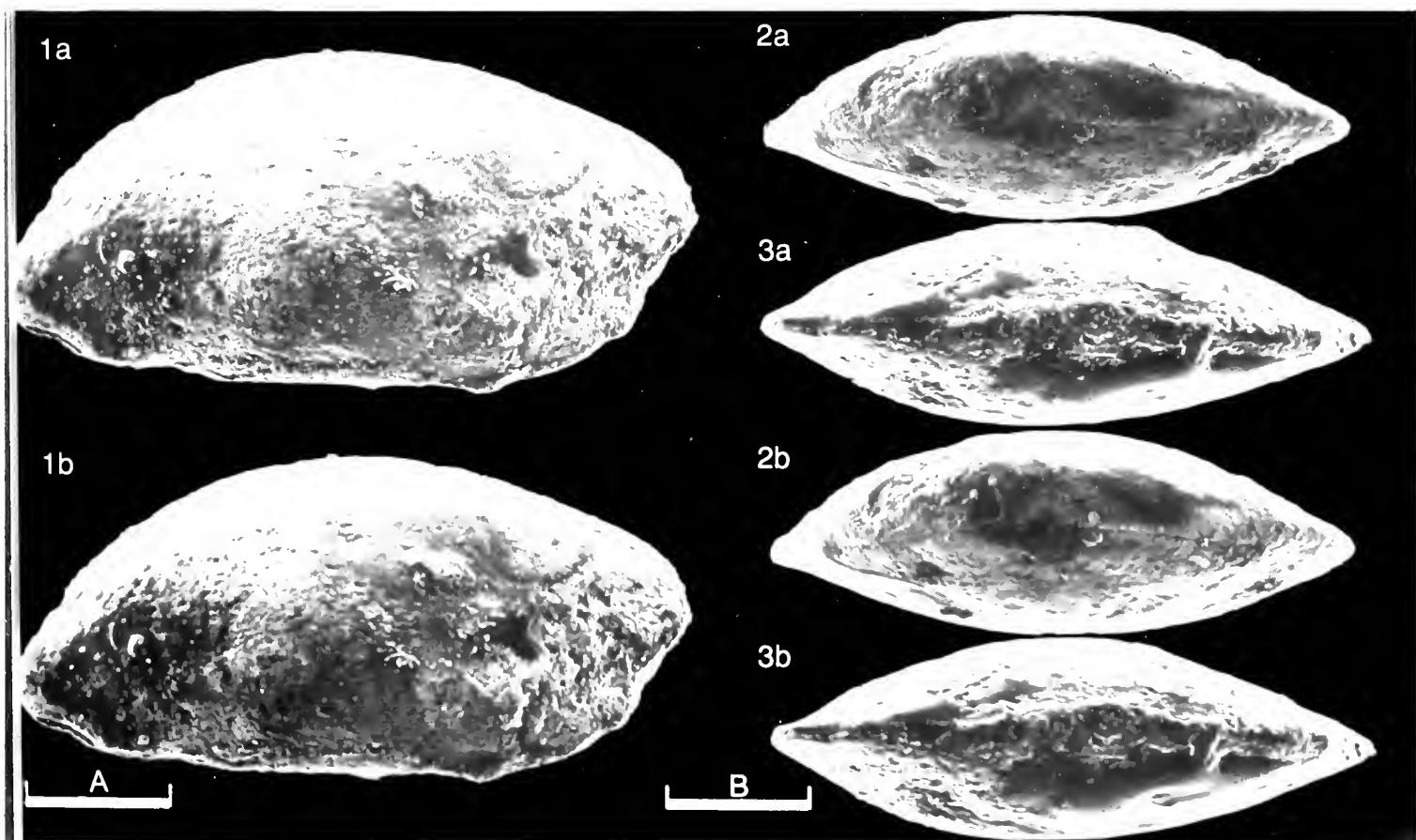
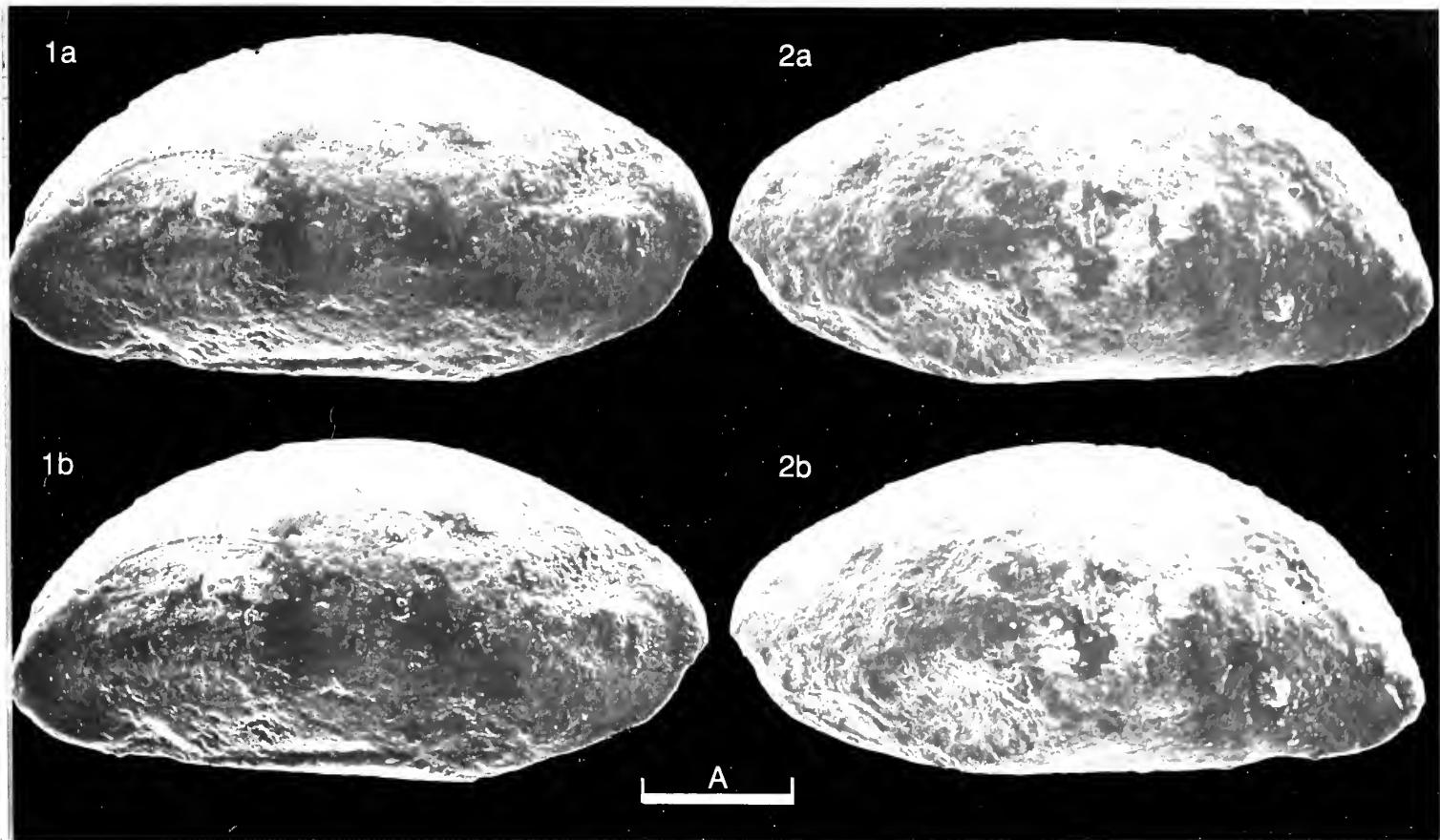
Remarks: *Bairdia jammuensis* can be easily distinguished from the associated species *B. beraguaensis* (see Singh, *Stereo-Atlas of Ostracod Shells*, 11, 141-144, 1984), *B. kalakotensis* (see Singh, *ibid.*, 11, 145-148, 1984) and *Bairdopplata kalakotensis* (see Neale & Singh, *ibid.*, 11, 137-140, 1984), by its elongate carapace, gently arched dorsal margin and straight ventral margin.

Distribution: *Bairdia jammuensis* occurs in the Kalakot Formation of the Subathu Group exposed in Jammu and Kashmir State; late early Eocene.

Explanation of Plate 13, 50

Fig. 1, 2. car. rt. lat. (paratype, L.U. 213, 990 µm long). Figs. 2, 3. car. (holotype, L.U. 212, 940 µm long): fig. 2, ext. dors.; fig. 3, ext. vent.

Scale A (200 µm; × 100), fig. 1; scale B (200 µm; × 90), figs. 2, 3.



ON PARACYPRIS JHINGRANI SINGH & TEWARI

by Pratap Singh
(33 Khur Bura, Dehra Dun, India)

Paracypris jhingrani Singh & Tewari, 1966

1966 *Paracypris jhingrani* sp. nov. P. Singh & B. S. Tewari in: B. S. Tewari & P. Singh, *Cent. Advan. Study in Geology, Panjab University, Chandigarh*, 3, 122, pl. 2, figs. 5a-d.

Holotype: University of Lucknow, India, coll. no. L.U. 220.

Type locality: Sample 22; dark grey, fossiliferous, argillaceous limestone of the Kalakot Formation, Subathu Group, late early Eocene. About 150 feet above road level in a cliff on the western side of the road leading to Gua from Beragua and situated at a distance of about 800 feet S15° W from the opening of the Beragua Mine in the Kalakot Coalfield (Survey of India topographic sheet 43K/8), Nawshera and Rajouri Tehsils of Poonch District, Jammu and Kashmir State, India (see Neale & Singh, *Stereo-Atlas Ostracod Shells*, 11, 139, text-fig. 1, 1984).

Figured specimens: University of Lucknow nos. L.U. 220 (holotype, car.: Pl. 13, 52, figs. 1, 2; Pl. 13, 54, figs. 1, 2). From the type locality and horizon.

Explanation of Plate 13, 52

Fig. 1, 2. car. (holotype, L.U. 220, 720 µm long); fig. 1, rt. lat.; fig. 2, lt. lat.
Scale A (100 µm; × 136), figs. 1, 2.

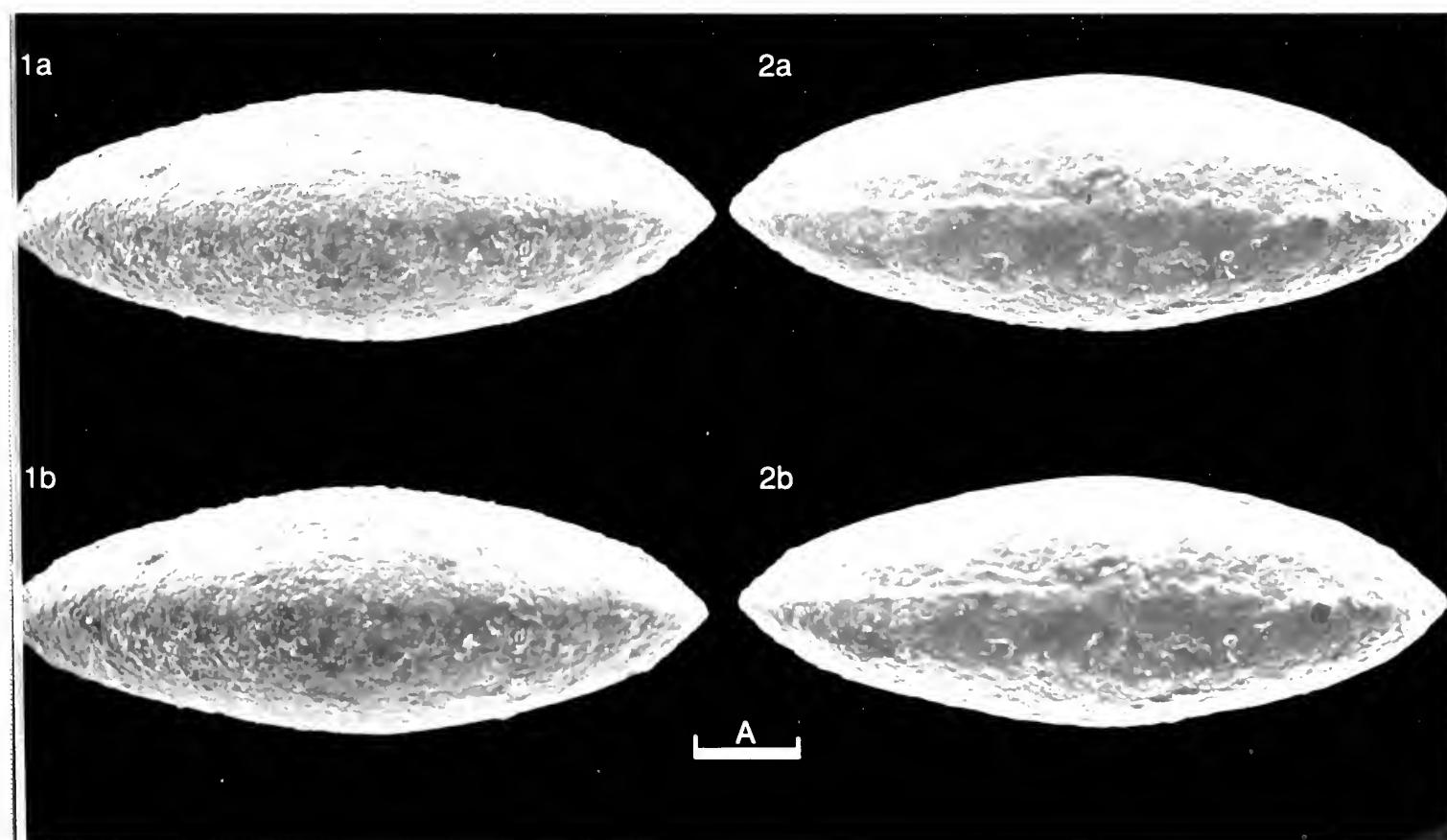
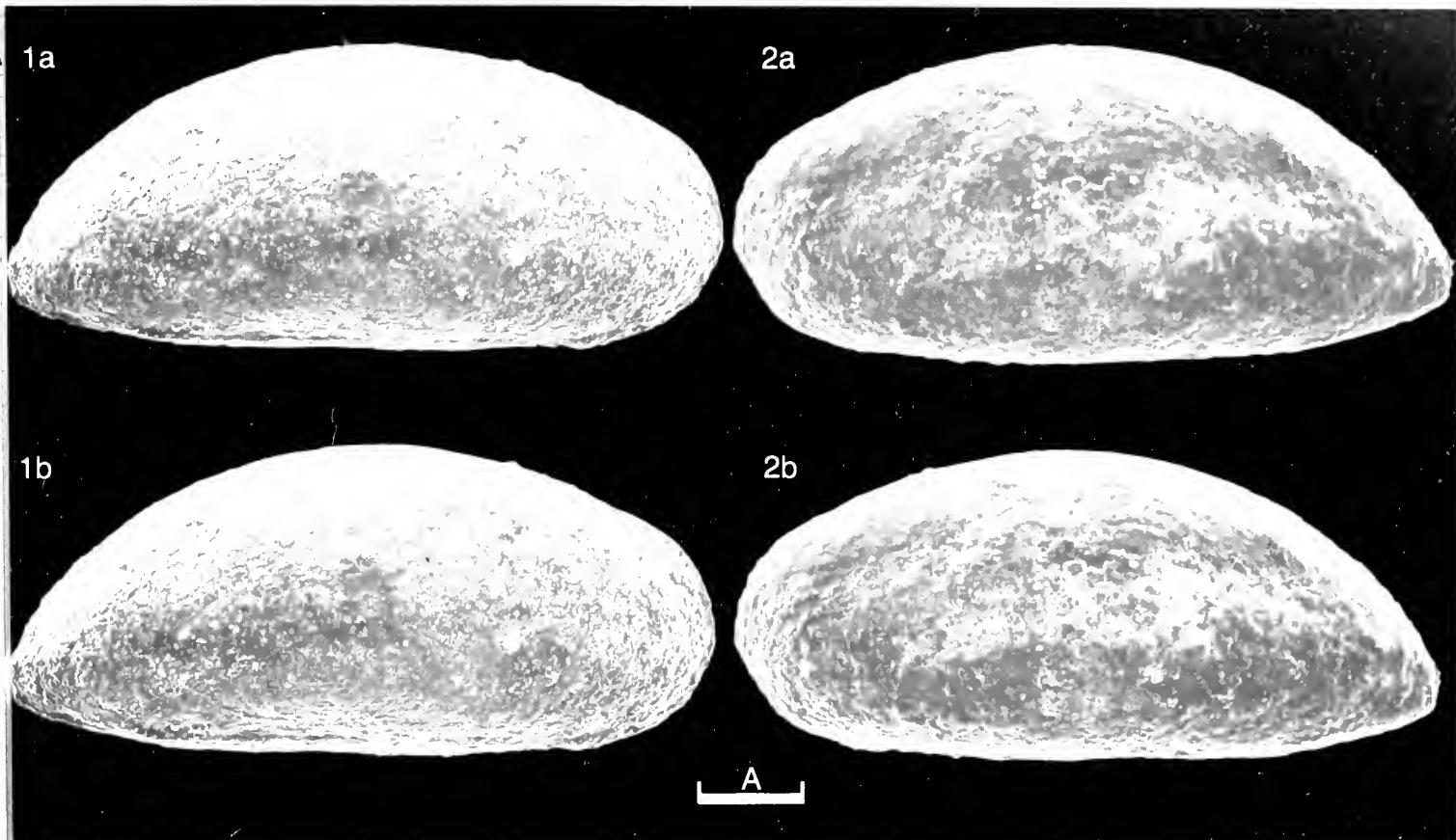
Diagnosis: Elongate, wedge-shaped; dorsal margin gently arched, ventral margin slightly convex; anterior end rounded; tapering posterior end; left valve larger and overlaps the right valve all around; length twice the height, highest part of carapace a little posterior of middle; lateral outline in dorsal and ventral views moderately convex with obtuse extremities, dorsal margin straight and ventral margin curved in middle.

Remarks: Pant and Khosla (*J. Geol. Soc. India*, 23, 512, 1982) in their note on the Eocene of Kutch, Gujarat, record *P. jhingrani* as *Phlyctenophora jhingrani*. It seems probable that the Kutch specimens are not conspecific with the Jammu and Kashmir material. The valve details such as pore canals and muscle scar pattern are not observable and for the present this species is left in the genus *Paracypris*.

Distribution: *P. jhingrani* occurs in the late early Eocene Kalakot Formation of the Subathu Group exposed in Jammu and Kashmir State.

Explanation of Plate 13, 54

Fig. 1, 2. car. (holotype, L.U. 220, 720 µm); fig. 1, dors.; fig. 2, vent.
Scale A (100 µm; × 136), figs. 1, 2.



ON *EOCYTHERIDEA KIRTLINGTONENSIS* BATE & MELLISH sp. nov.

by R. H. Bate & Claire Mellish

(Stratigraphic Services International, Surrey & British Museum (Natural History), London)

Eocytheridea kirtlingtonensis sp. nov.

1978 *Eocytheridea* sp. A.; R. H. Bate, in: R. H. Bate & E. Robinson (Eds.), A Stratigraphical Index of British Ostracoda, *Geol. J. Spec. Issue*, 8, 242, pl. 9, fig. 9.

Holotype: British Museum (Nat. Hist.) no. OS 9668, ♀ LV.

[Paratypes: OS 9389, 9669, 12127–9, 12188–9].

Type locality: Kirtlington Cement Quarry, Oxfordshire, England. Grid reference: SP 49451985. Lower Cornbrash, Bathonian, Jurassic.

Figured specimens: British Museum (Nat. Hist.) OS 9668 (holotype, ♀ LV: Pl. 13, 56, fig. 1), OS 12127 ♂ RV: Pl. 13, 56, fig. 2), OS 12128 (♀ LV: Pl. 13, 56, fig. 3), OS 12189 (♀ car: Pl. 13, 58, fig. 1), OS 12188 (♀ car: Pl. 13, 58, fig. 2), OS 12129 (♀ RV: Pl. 13, 58, fig. 3).

[All Specimens are from the type locality and horizon, sample KL.A.59]

Explanation of Plate 13, 56

Fig. 1, ♀ LV, ext. lat. (holotype, OS 9668, 800 µm long); fig. 2, ♂ RV, ext. lat. (OS 12127, 790 µm long); fig. 3, ♀ LV, int. lat. (OS 12128, 570 µm long).

Scale A (200 µm; × 75), figs. 1–2; scale B (200 µm; × 105), fig. 3.

Diagnosis: *Eocytheridea* with oval carapace widest in posterior half and with waist-like constriction just anterior of median point (dorsal and ventral views). Males more elongate than females. Posterior tapers to a point situated at mid-height and through which runs line of greatest length. Anterior end broadly rounded; dorsal and ventral margins broadly convex. Lateral surface ornamented with a triangular pattern of irregular, sometimes branching, ridges. Left valve larger than and overreaching the right valve on all sides. Distinct normal pore canal apertures especially visible on dorsal and ventral surfaces. Hinge antimerodont with large loculate sockets and a short dentate median bar with an accommodation groove above in the left valve. Right valve hinge with large posterior and anterior dentate ridges and with a short median groove. Muscle scars with a clover-leaf-shaped frontal scar medially positioned anterior to curved row of adductor scars. Inner margin and line of concrescence coincide. Radial pore canals not seen in present material.

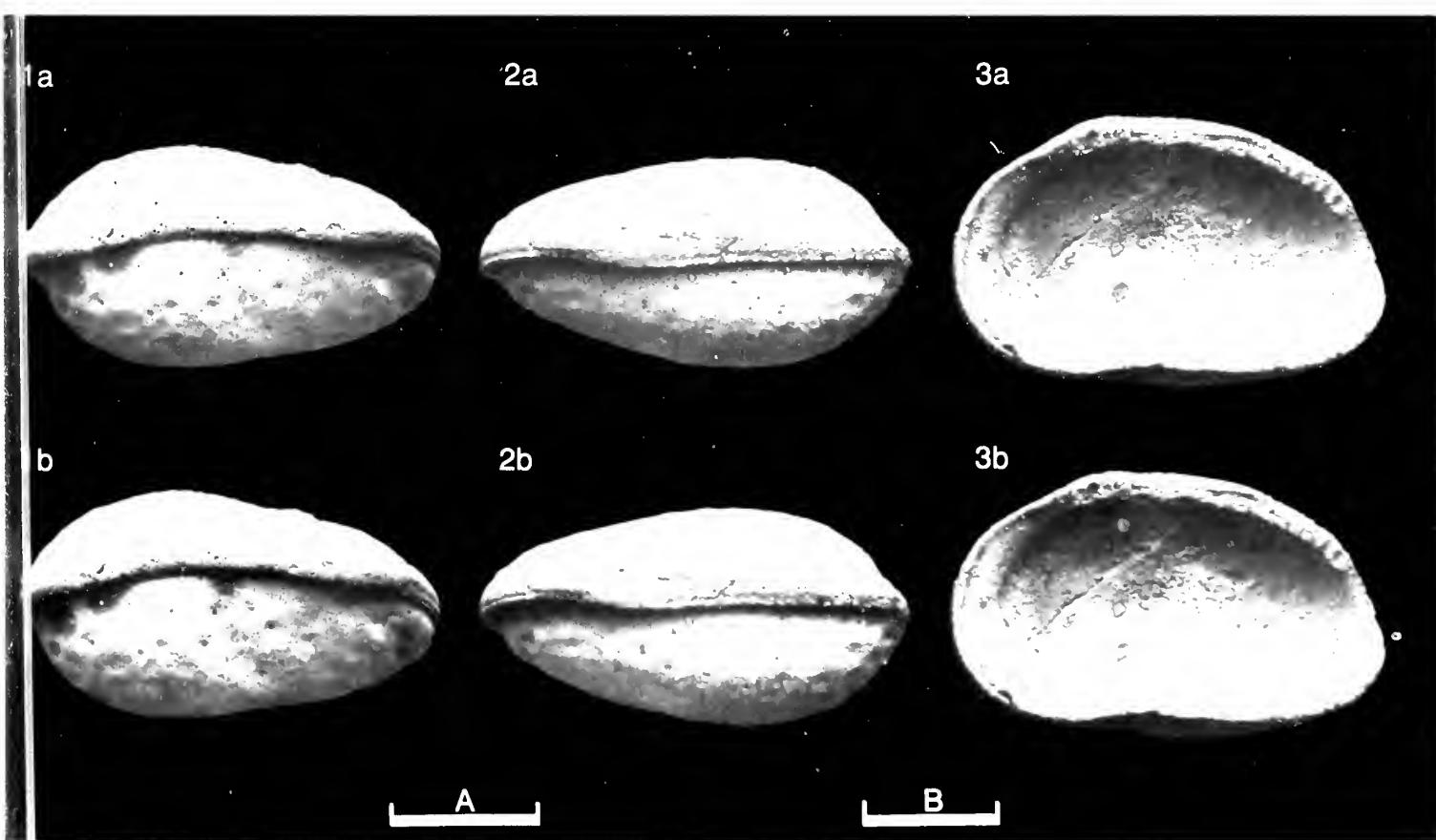
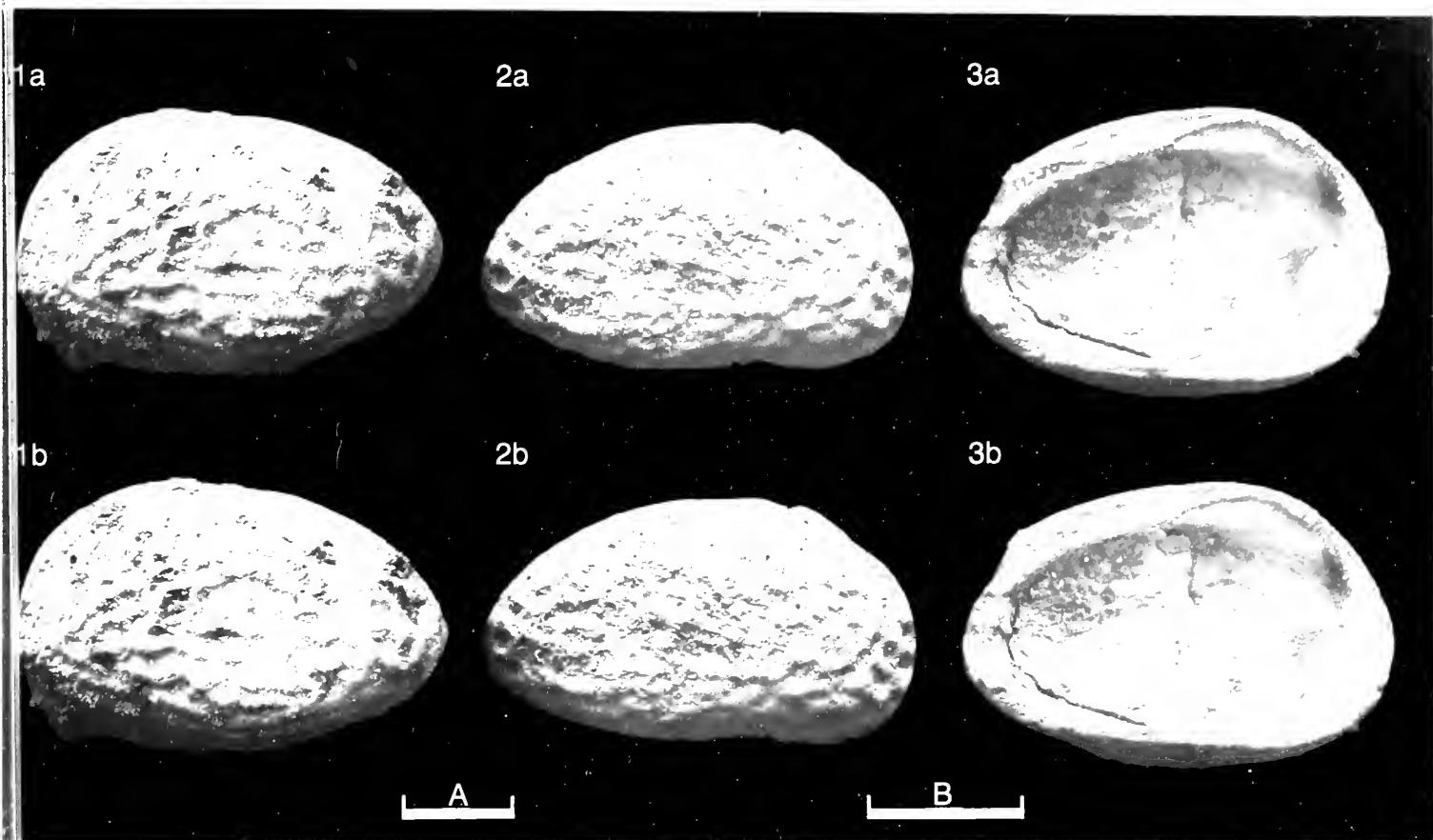
Remarks: *E. kirtlingtonensis* possesses a triangular pattern of ridges on its lateral surface that differs from that of *E. reticulata* Bate, 1964 from the Bajocian of Lincolnshire (*Bull. Br. Mus. nat. Hist., Geol.*, 10, 21) by being composed of more closely spaced ridges having an irregular outline that in some specimens make it difficult to distinguish the triangular arrangement. At the present time *E. kirtlingtonensis* appears to be the last surviving species of this middle Jurassic genus that environmentally is associated with shallow marine sediments deposited close to shore.

Distribution: *E. kirtlingtonensis* is recorded from the lower Cornbrash and Wychwood Beds (Forest Marble) of the Old Cement Quarry, Kirtlington, Oxfordshire, England. It has not been found in the deeper water facies to the south. Stratigraphically this species has an upper Bathonian range, apparently restricted to the ammonite *aspidooides* Zone. It is thus an important marker species for the late Bathonian within a shallow marine environment.

Explanation of Plate 13, 58

Fig. 1, ♀ car., dors. (OS 12189, 610 µm long); fig. 2, ♀ car., vent. (OS 12188, 600 µm long); fig. 3, ♀ RV, int. lat. (OS 12129, 690 µm long).

Scale A (200 µm; × 100), figs. 1–2; scale B (200 µm; × 85), fig. 3.



ON *CY THEREIS LINDIENSIS* BATE

by R. H. Bate & Claire Mellish

(Stratigraphic Services International, Surrey & British Museum (Natural History), London)

Cythereis lindiensis Bate, 1969

- 1969 *Cythereis lindiensis* sp. nov. R. H. Bate, *Proc. 3rd African Micropal. Coll.*, Cairo 1968, 140, pl. 6, figs. 1–4.
 1973 *Cythereis lindiensis* Bate; E. Grosdidier, *Revue Inst. franç. Pétrole*, 28, 135, pl. 13, fig. 104.

Holotype: British Museum (Nat. Hist.) no. IO 771, ♀ carapace.

[Paratypes: IO 778, 779, 1393–7].

Type locality: Nalukundi stream, just north of Maweni Creek, 13 miles south-west of Lindi, Tanzania ($39^{\circ}80' E$; $10^{\circ}10' S$). Cenomanian shales (sample B150), Cretaceous.*Figured specimens*: British Museum (Nat. Hist.) IO 771 (holotype, ♀ car.: Pl. 13, 60, fig. 1), IO 1393 (♂ car.: Pl. 13, 60, fig. 21), IO 779 (♂ RV: Pl. 13, 62, figs. 1–3), IO 1394 (♀ car.: Pl. 13, 60, fig. 3), IO 778 (♂ LV: Pl. 13, 62, figs. 4–7).

All specimens are from the type locality and horizon.

Explanation of Plate 13, 60

Fig. 1, ♀ car., lt. lat. (holotype, IO 771, 880 μm long); fig. 2, ♂ car., rt. lat. (IO 1393, 870 μm long); fig. 3, ♂ car., dors. (IO 1394, 870 μm long).

Scale A (200 μm ; $\times 70$), figs. 1–3.*Cythereis lindiensis* (3 of 4)

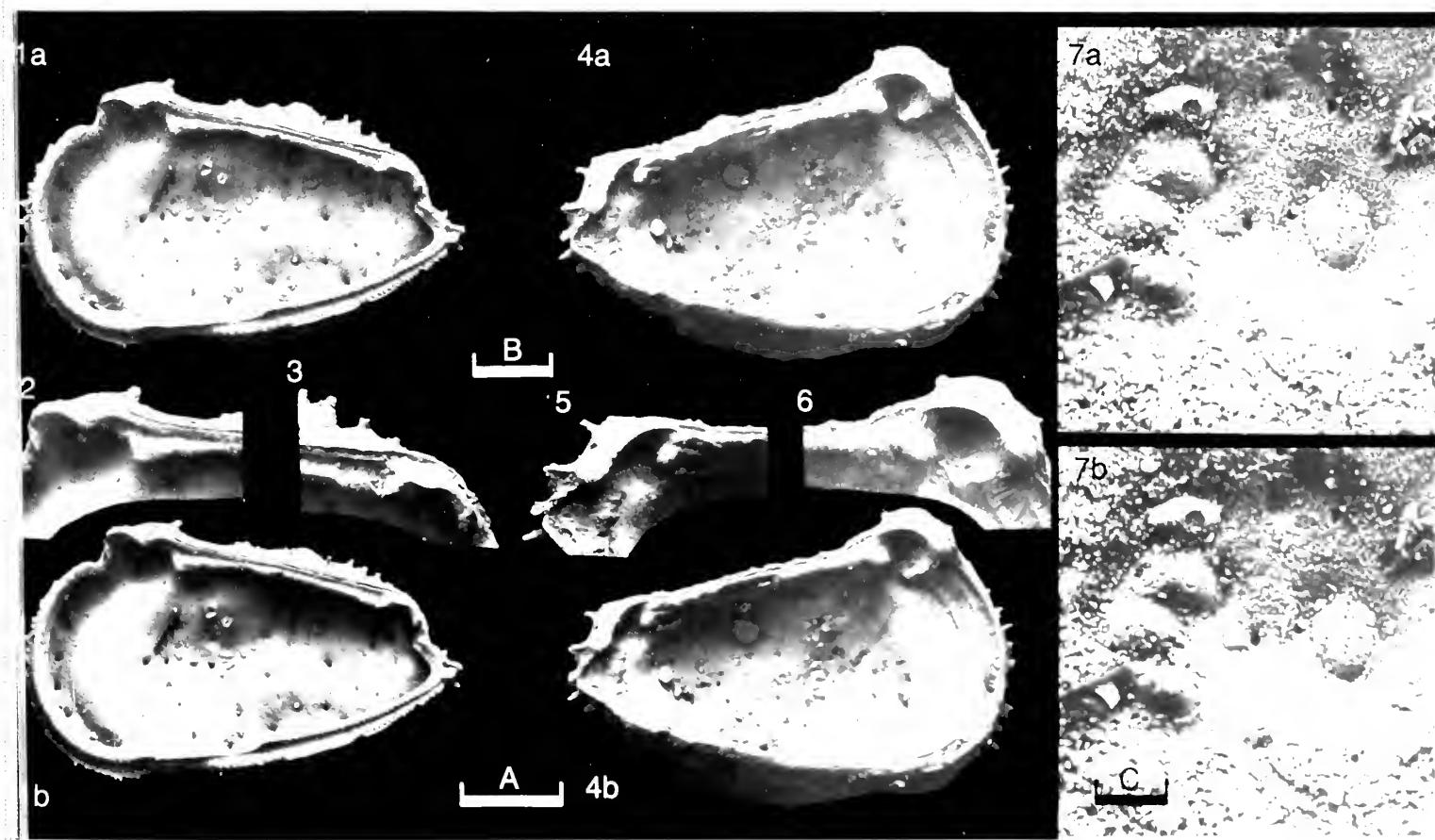
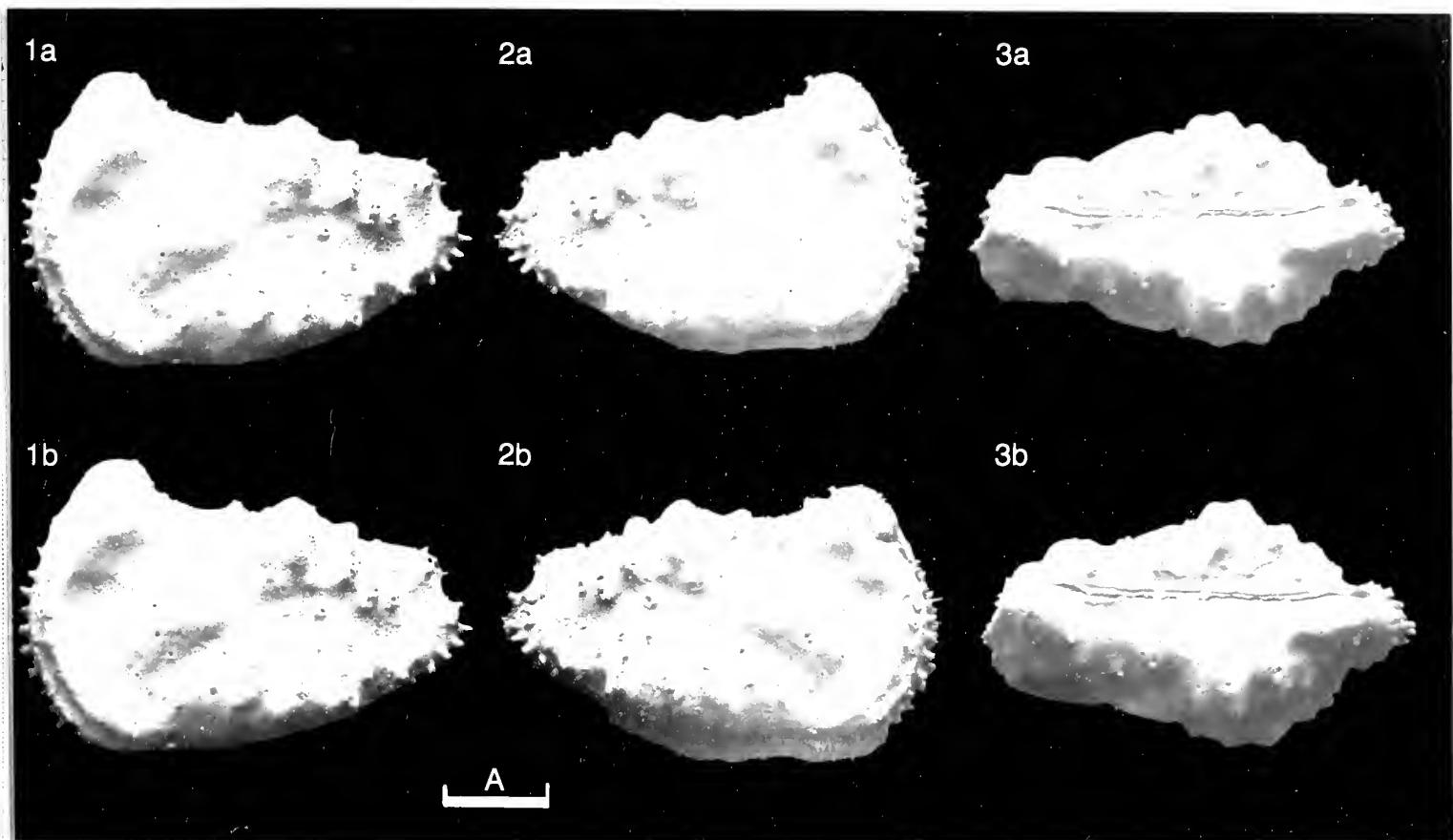
Stereo-Atlas of Ostracod Shells 13, 61

Diagnosis: *Cythereis* having broad, low, subcentral tubercle; dorsal and ventral ridges swollen, broken up into a number of vertical ridges. Eye swelling distinct. Shell surface smooth except for area behind anterior marginal ridge, within the furrows and on the posterior marginal border where the surface is finely pitted. Hinge amphidont with faintly notched, plug-like anterior tooth in right valve with deep, smooth, anteromedian socket, long, locellate median groove and 6 posterior teeth; left valve with complementary terminal sockets and dentate median bar. Selvage with ridged surface. Radial pore canals straight, approximately 15 anteriorly and 4 posteriorly. Muscle scars with V-shaped frontal scar. Anterior and posteroventral marginal spines well developed. Left valve larger than right.*Remarks*: *C. lindiensis* is a morphologically distinct species recognised by the swollen dorsal and ventral ridges that are characteristically subdivided into vertical ridges. A re-examination of the type material has allowed us to emend the diagnosis by the recognition of the dentate character of the median hinge element. Additionally we have now been able to resolve the pitted nature of the supposedly smooth lateral surface just behind the anterior marginal ridge. These pits are not randomly orientated but tend to be aligned into rows. Pits also occur within the surface furrows and on the posterior marginal border.*Distribution*: *Cythereis lindiensis* was first described from Cenomanian shales exposed in the Nalukundi stream, south of Lindi (sample B150), Tanzania, and from Kiwangwa shale (Cenomanian) developed in the Wami River area to the north (samples B22–27). Subsequently the species has been found in Albian shales (samples B37–40) exposed on the banks of the Wami River near the village of Gongo. Grosdidier (1973 *op. cit.*) records *C. lindiensis* from offshore Iran near the island of Sirri ($54^{\circ}50' E$; $25^{\circ}50' N$) and south-west of Bushir ($50^{\circ}10' E$; $28^{\circ}40' N$). Thus the stratigraphical range of *C. lindiensis* is from Albian to Cenomanian and its geographical range is from S Tanzania to Iran. It has not yet been recognised south of Tanzania despite the detailed work of Dingle on the Cretaceous ostracods of South Africa.

Explanation of Plate 13, 62

Figs. 1–3, ♂ RV (IO 779, 880 μm long): fig. 1, int. lat.; figs. 2, 3, anterior and posterior hinge elements. Figs. 4–7, ♂ LV (IO 778, 880 μm long): fig. 4, int. lat.; figs. 5, 6, posterior and anterior hinge elements; fig. 7, muscle scars.

Scale A (200 μm ; $\times 70$), figs. 1, 4; scale B (100 μm ; $\times 100$), figs. 2, 3, 5, 6; scale C (20 μm ; $\times 460$), fig. 7.



ON NAVARRACY THERE ESTELLENSIS COLIN & RODRIGUEZ-LAZARO gen. et sp. nov.

by J. P. Colin & J. Rodriguez-Lazaro

(Esso Production Research-European Laboratory, Bégles, France & Universidad del País Vasco, Bilbao, Spain)

Genus NAVARRACY THERE gen. nov.

Type-species: *Navarracythere estellensis* sp. nov.

Diagnosis: A trachyleberidine genus; ventral ridge not connected with anterior ridge and formed by a series of massive tubercles, especially the posterior one. Sub-central tubercle well developed. Dorsal margin bearing two main processes; a median cone and a massive posterior tubercle. Ornamentation usually reticulate. Distinct hinge-ear on the left valve. Amphidont hinge. Marginal pore canals numerous, simple and straight.

Remarks: *Parexophthalmocythere* (*Amphiexophthalmocythere*) Grundel, 1975 (*Freiberger ForschHft.*, **304**, 33–37), presents a more triangular outline, a distinct trilobate posterior tooth in the left valve and a wider marginal zone. *Kanajcythereis* Pokorný & Colin, 1976 (*Cas. Miner. Geol.*, **21**, 23–31) has different ornamentation with distinct longitudinal ventral and dorsal ridges and a crenulate hinge. Other species included in this new genus are: *Cythereis* sp. 307 Oertli, 1958, from the Aptian of SE France (*Revue Inst. fr. Pétrole*, **13**, 1514, pl. 8, fig. 170, pl. 9, fig. 199); *Cythereis?* *dorsospinata* *dorsospinata* Damotte, 1971 (*Mém. Soc. géol. Fr.*, **113**), from the Cenomanian of the Paris Basin; *Cythereis?* *dorsospinata charentensis* Colin, 1974 (*Eclog. geol. Helv.*, **67**, 448–9, pl. 1, figs. 1–3), from the Cenomanian of SW France; *Spinolebris aculeata* Donze, 1972 (*Eclog. geol. Helv.*, **65**, 380–2, pl. 2, figs. 1–6, pl. 3, figs. 1–10), from the Cenomanian-Turonian of SE France; *Cythereis?* *morralensis* Andreu, 1983 and *Cythereis sobrefrontensis* Andreu, 1983, from the late Albian of Spain (*Bull. Cents. Rech. Expl.-Prod. Elf-Aquitaine*, **7**).

Explanation of Plate 13, 64

Fig. 1, ♀ car., ext. rt. lat. (BIPA 2061, 570 µm long); fig. 2, ♀ RV, ext. lat. (BIPA 2062, 580 µm long); fig. 3, ♀ RV, int. lat. (BIPA 2063, 536 µm long).

Scale A (100 µm; ×105), figs. 1, 2; scale B (100 µm; ×112), fig. 3.

Distribution: The known stratigraphic range of this genus is from the Aptian to the Turonian of Western Europe.

Navarracythere estellensis sp. nov.

Holotype: Deposited in the collections of the Geology Department, Universidad del País Vasco, Bilbao (BIPA 2060); ♀ LV.

Type locality: About 550 m W of Ganuza near Estella, Navarra, Spain: approx. lat. 42°42' N, long. 02°07' W. Early to middle Cenomanian, Cretaceous.

Figured specimens: Universidad de País Vasco nos. BIPA 2061 (♀ car.: Pl. 13, 64, fig. 1), BIPA 2062 (♀ RV: Pl. 13, 64, fig. 2), BIPA 2063 (♀ RV: Pl. 13, 64, fig. 3), BIPA 2060 (♀ LV: Pl. 13, 66, fig. 1), BIPA 2064 (♂ car.: Pl. 13, 66, fig. 2), BIPA 2065 (♂ car.: Pl. 13, 66, fig. 3).

All the specimens are from the Cenomanian of the type-locality: from brownish micaceous marls of early to middle Cenomanian age (*Rotalipora reicheli* Zone), with *Rotalipora brotzeni*, *Praeglobotruncana stephani*, *Rotalipora montsalvensis* and *Favusella washitensis*.

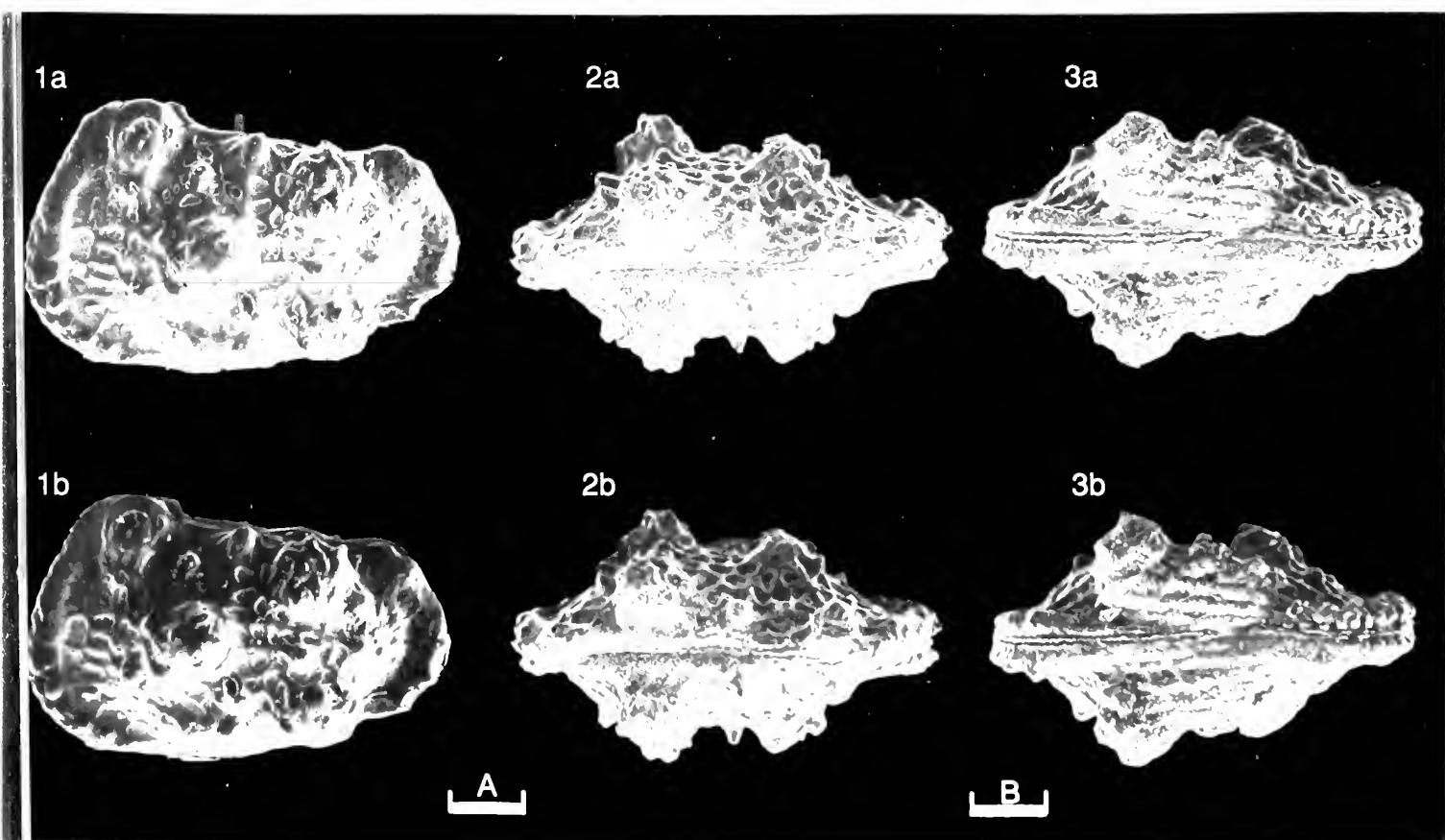
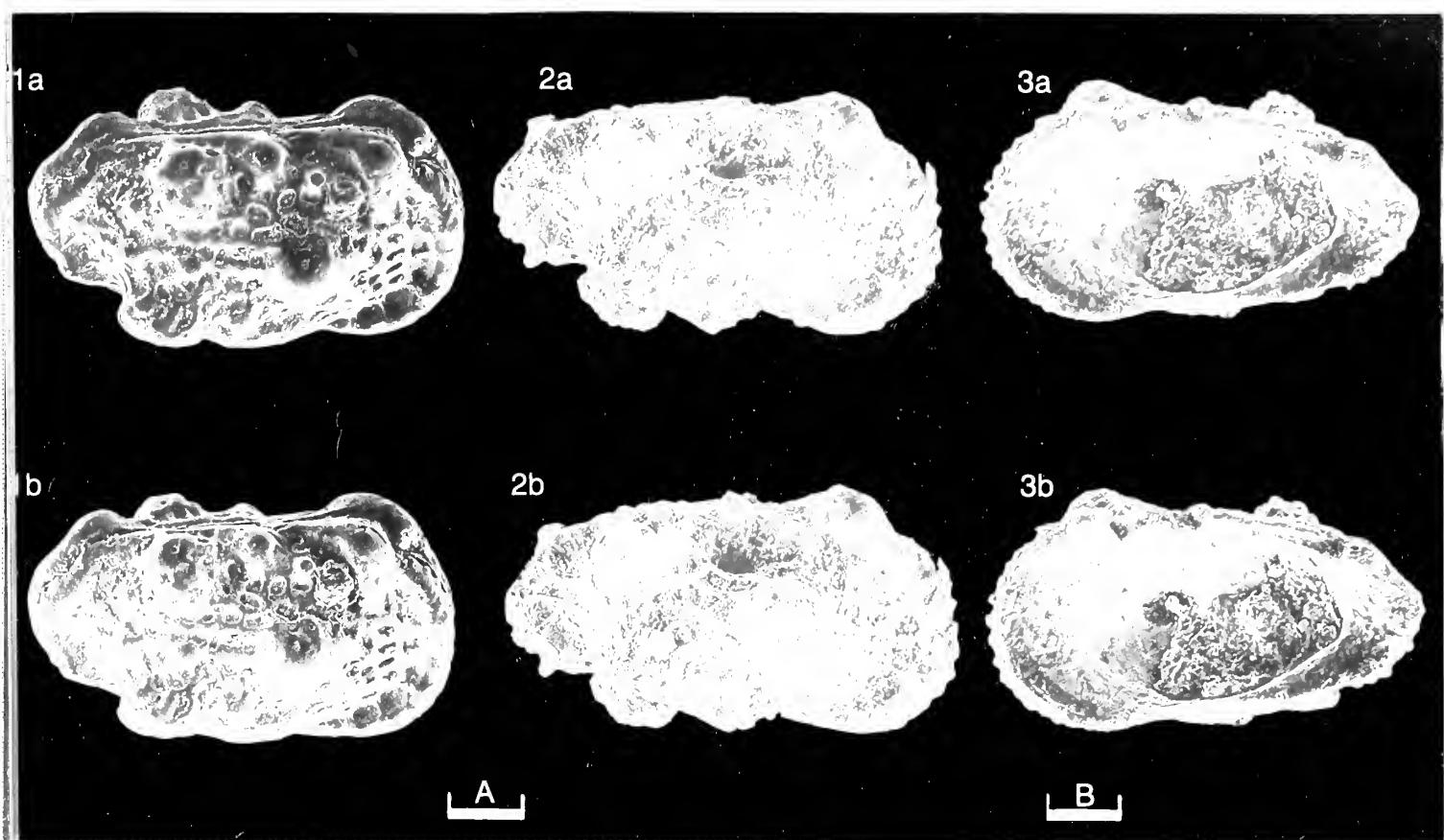
Diagnosis: *Navarracythere* species with strong development of the sub-central, postero-ventral and postero-dorsal tubercles, which may be smooth or spinose; surface of the valves deeply reticulate.

Distribution: Early to middle Cenomanian of Navarra and Soria Provinces, Spain.

Explanation of Plate 13, 66

Fig. 1, ♀ LV, ext. lat. (holotype BIPA 2060, 571 µm long); fig. 2, ♀ car., ext. dors. (BIPA 2064, 666 µm long); fig. 3, ♂ car., ext. vent. (BIPA 2065, 665 µm long).

Scale A (100 µm; ×105), fig. 1; scale B (100 µm; ×95), figs. 2, 3.



ON KEFIELLA MARESI DONZE & SAID

by J. P. Colin
(Esso Production Research-European Laboratory, Bègles, France)

Genus KEFIELLA Donze & Said, 1982

Type-species (by original designation): *Kefiella maresi* Donze & Said, 1982

- Diagnosis:** A blind trachyleberidid genus (no eye tubercle) with a carapace anteriorly and posteriorly compressed. Valve surface covered by reticulation with smaller meshes on the anterior and posterior fields. Ventral and dorsal ridges reduced to a series of pore conuli. Ventral ridge not connected with the anterior ridge. Sub-central tubercle smooth and well developed followed posteriorly by a short longitudinal ridge. Sexual dimorphism well marked. Anterior marginal zone moderately wide without vestible. Marginal pore canals numerous, simple, grouped into two's or three's. Amphidont hinge.
- Remarks:** This genus is morphologically related to the deep-water genera *Atlanticythere* Benson, 1977 (*Init. Rep. D. S. D. P.*, 39, 876–7, pls. 1, 2), and *Dutoitella* Dingle, 1981 (*Annu. S. Afr. Mus.*, 85, 84–92). *Atlanticythere* is larger, has no median ridge and a foveolate ornamentation. In *Dutoitella* the ventral ridge is in continuity with the anterior ridge. Dingle (1981) introduced the sub-family Unicapellinae for these genera.

Explanation of Plate 13, 68

Fig. 1, ♀ car., ext. rt. lat. (EPR-E 18431, 646 µm long); fig. 2, ♀ car., ext. lt. lat. (EPR-E 18429, 656 µm long); fig. 3, ♀ car., ext. vent. (EPR-E 18451, 656 µm long).
Scale A (100 µm; × 96), figs. 1–3.

Kefiella maresi Donze & Said, 1982

1982 *Kefiella maresi* Donze & Said n. gen. n. sp. in: P. Donze, J. P. Colin, R. Damotte, H. J. Oertli, J. P. Peypouquet & R. Said, *Bull. Centr. Rech. Expl.-Prod. Elf-Aquitaine*, 6, 290–291, pl. 8, figs. 1–10, pl. 9, figs. 1–2, pl. 14, fig. 7.

- Holotype:** Deposited in the collections of the Dept. des Sciences de la Terre, Université Claude Bernard, Lyon, France; ♂ carapace.
- Type locality:** El Kef section, NW Tunisia; x = 288·0; y = 318·5. Late Maastrichtian, Cretaceous.
- Figured specimens:** EPR-E nos. 18431 (♀ car.: Pl. 13, 68, fig. 1), 18429 (♀ car.: Pl. 13, 68, fig. 2), 18451 (♀ car.: Pl. 13, 68, fig. 3), 18444 (♀ RV: Pl. 13, 70, fig. 1), 18447 (♀ LV: Pl. 13, 70, fig. 2), 18441 (♀ car.: Pl. 13, 70, fig. 3).

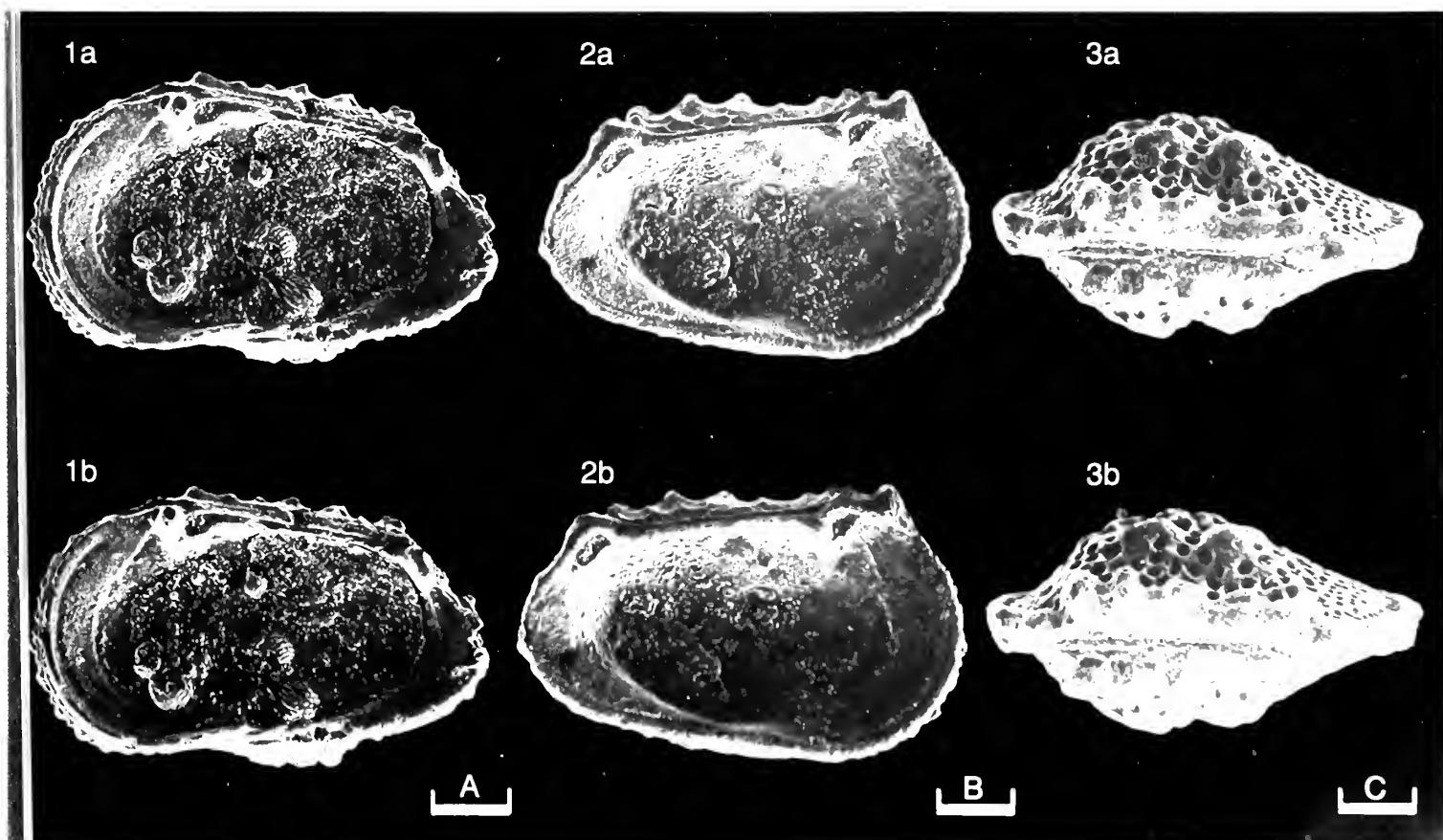
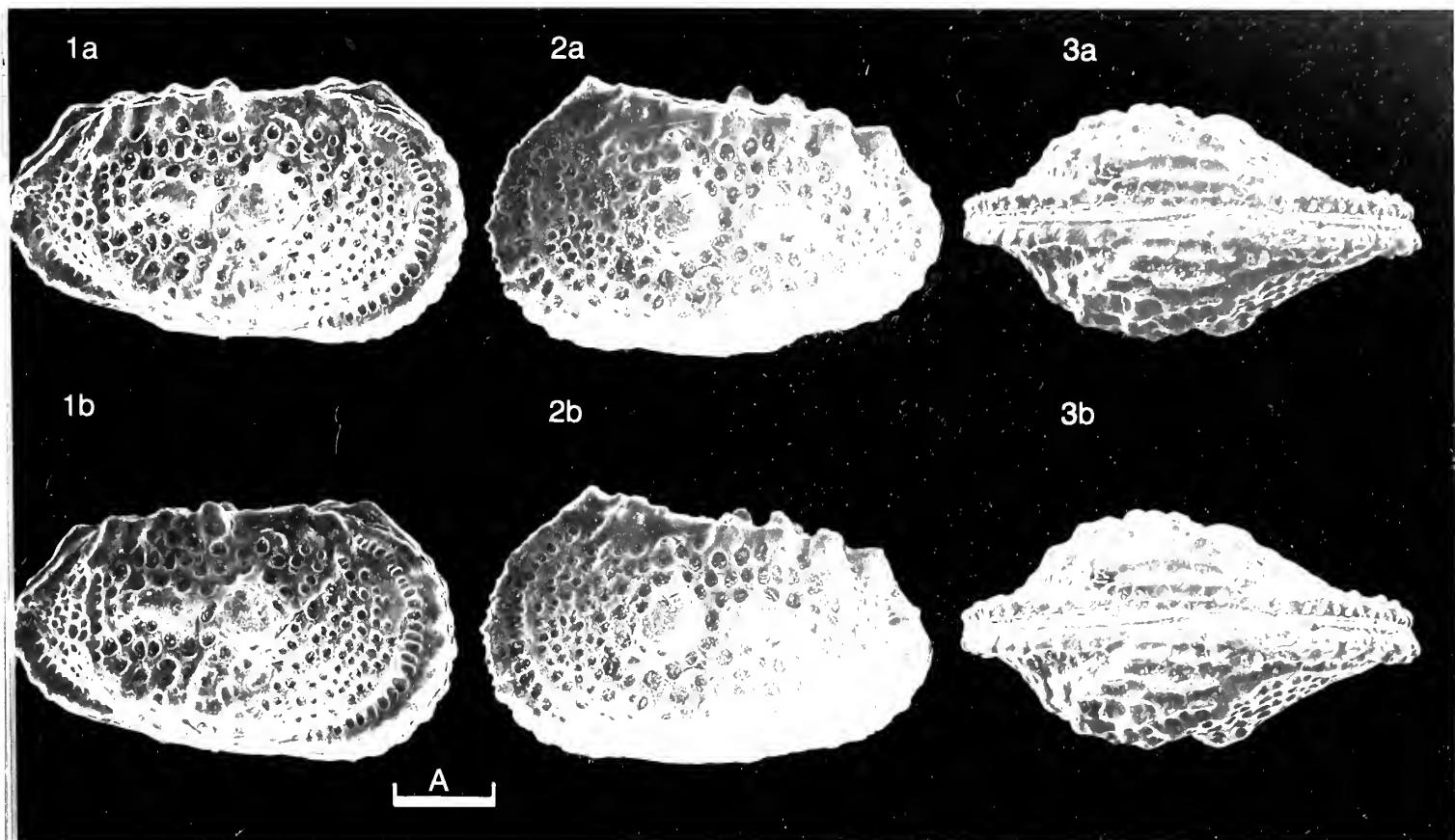
All the specimens are from the late Maastrichtian of the type-locality: marls of the *Globotruncana gansseri* and *Abathomphalus mayaroensis* zones (upper bathyal environment).

Diagnosis: As for the genus.

Distribution: Late Maastrichtian of Tunisia.

Explanation of Plate 13, 70

Fig. 1, ♀ RV, int. lat. (EPR-E 18444, 650 µm long); fig. 2, ♀ LV, int. lat. (EPR-E 18447, 660 µm long); fig. 3, ♀ car., ext. dors. (EPR-E 18441, 635 µm long).
Scale A (100 µm; × 100), fig. 1; scale B (100 µm; × 91), fig. 2; scale C (100 µm; × 96), fig. 3.



ON *EUCY THERE ARGUS* (SARS)

by David J. Horne & Amnon Rosenfeld
(City of London Polytechnic & Geological Survey of Israel)

Eucythere argus (Sars, 1866)

- 1866 *Cytheropsis Argus* sp. nov. G. O. Sars, *Fork. VidenskSelsk. Krist.*, **1865**, 58.
 1868 *Eucythere Argus* (Sars); G. S. Brady, *Trans. Linn. Soc. Lond.*, **26**, 431, pl. 27, figs. 49–51.
 1874 *Eucythere Argus* (Sars); G. S. Brady, H. W. Crosskey & D. Robertson, *Palaeontogr. Soc. (Monogr.)*, **28**, 183, pl. 10, figs. 12–15.
 1925 *Eucythere Argus* (Sars); G. O. Sars, *An account of the Crustacea of Norway*, **9**, *Ostracoda*, pts. 9, 10, 162–163, pl. 75, fig. 1.
 1929 *Eucythere undulata* sp. nov. W. Klie, *Z. wiss. Zool.*, **134**, 274–277, figs. 1–7.
 1938 *Eucythere Argus* (Sars); W. Klie, in: F. Dahl, *Die Tierwelt Deutschlands*, **34**, (3), 178, figs. 591–594.
 1938 *Eucythere undulata* Klie; W. Klie, *Ibid.*, 179–180, figs. 599–602.
 1957 *Eucythere declivis* (Norman); C. W. Wagner, *Sur les Ostracodes du Quaternaire récent des Pays-Bas et leur utilisation dans l'étude géologiques des dépôts holocènes*, 43–44 (pars), pl. 15, figs. 1–4 only (non fig. 5), Mouton & Co., The Hague.
 1977 *Eucythere Argus* (Sars); A. Rosenfeld, *Meyniana*, **29**, 20, pl. 3, figs. 43–45.
 1981 *Eucythere Argus* (Sars); T. Cronin, *Micropaleontology*, **27**, 396, pl. 4, figs. 3, 4, 6.

Explanation of Plate 13, 72

Fig. 1, ♀ LV, ext. lat. (**1985.159**, 630 µm long); figs. 2–4, ♂ LV (**1986.392**, 580 µm long): fig. 2, ext. lat.; figs. 3, 4, details of ornament and sieve-pores in ant. region.
 Scale A (100 µm; × 95), figs. 1, 2; scale B (10 µm; × 900), fig. 3; scale C (10 µm; × 1800), fig. 4.

Type specimens: None are listed in Sars' collection at the Zoological Museum, Oslo, Norway.

Type locality: Oslo Fjord (=Christianiafjord) and Oxfjord, Finnmark, Norwegian coasts.

Figured specimens: British Museum (Nat. Hist.) nos. **1985.159** (♀ LV; Pl. 13, 72, fig. 1), **1986.392** (♂ car. + appendages; LV; Pl. 13, 72, figs. 2–4; RV; Pl. 13, 74, figs. 2–5; ♂ copulatory appendage; Text-fig. 1f). Hancock Museum, University of Newcastle, nos. **1.56.09** (♀ car.; LV; Pl. 13, 74, fig. 1; RV; Text-fig. 1i), **1.56.10** (♀ RV; Text-fig. 1g), **1.56.11** (♂ appendages; Text-figs. 1d–e), **1.56.12** (♂ RV; Text-fig. 1h). Hamburg Museum specimen (Ω appendages; Text-figs. 1a–c).

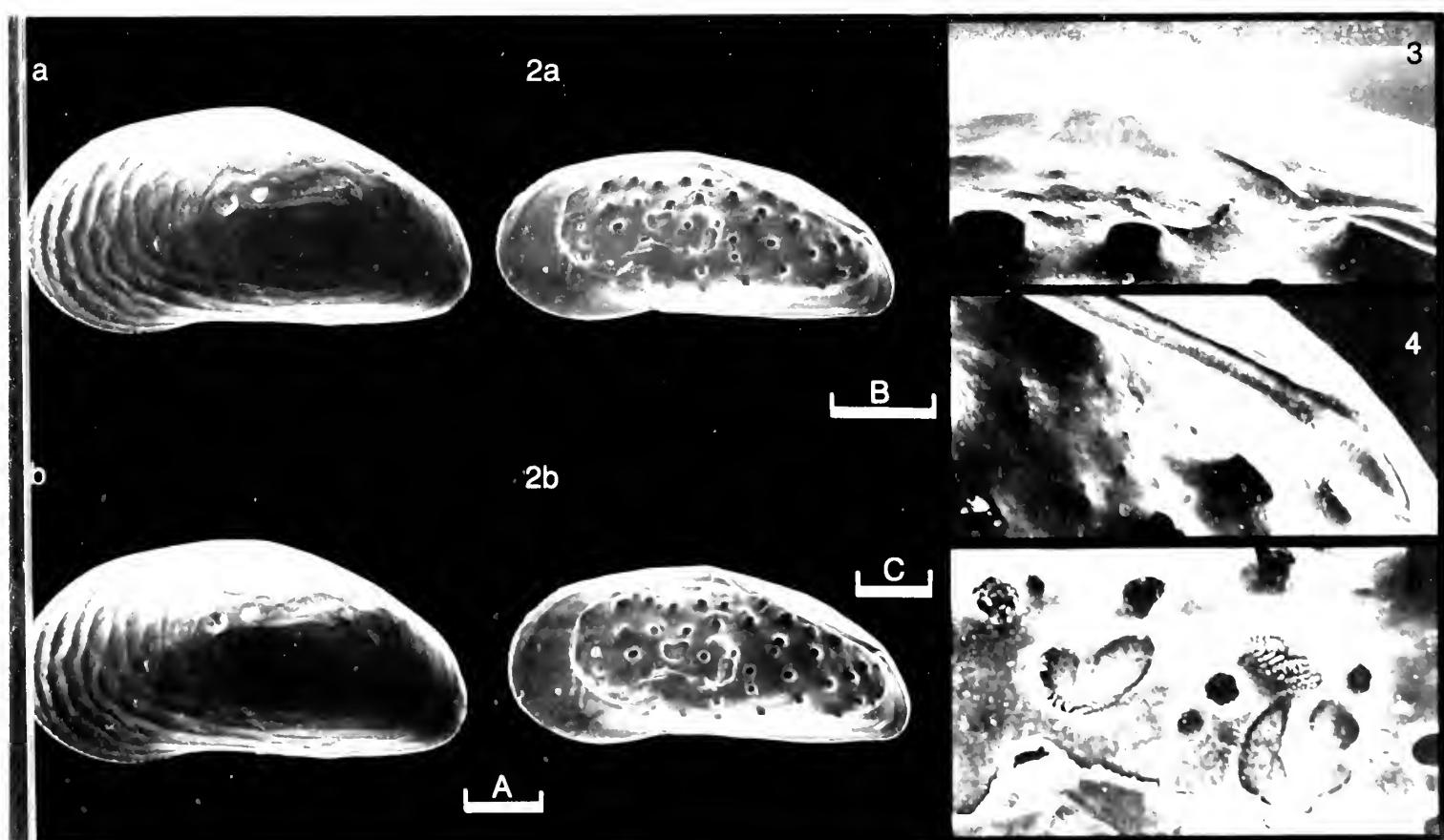
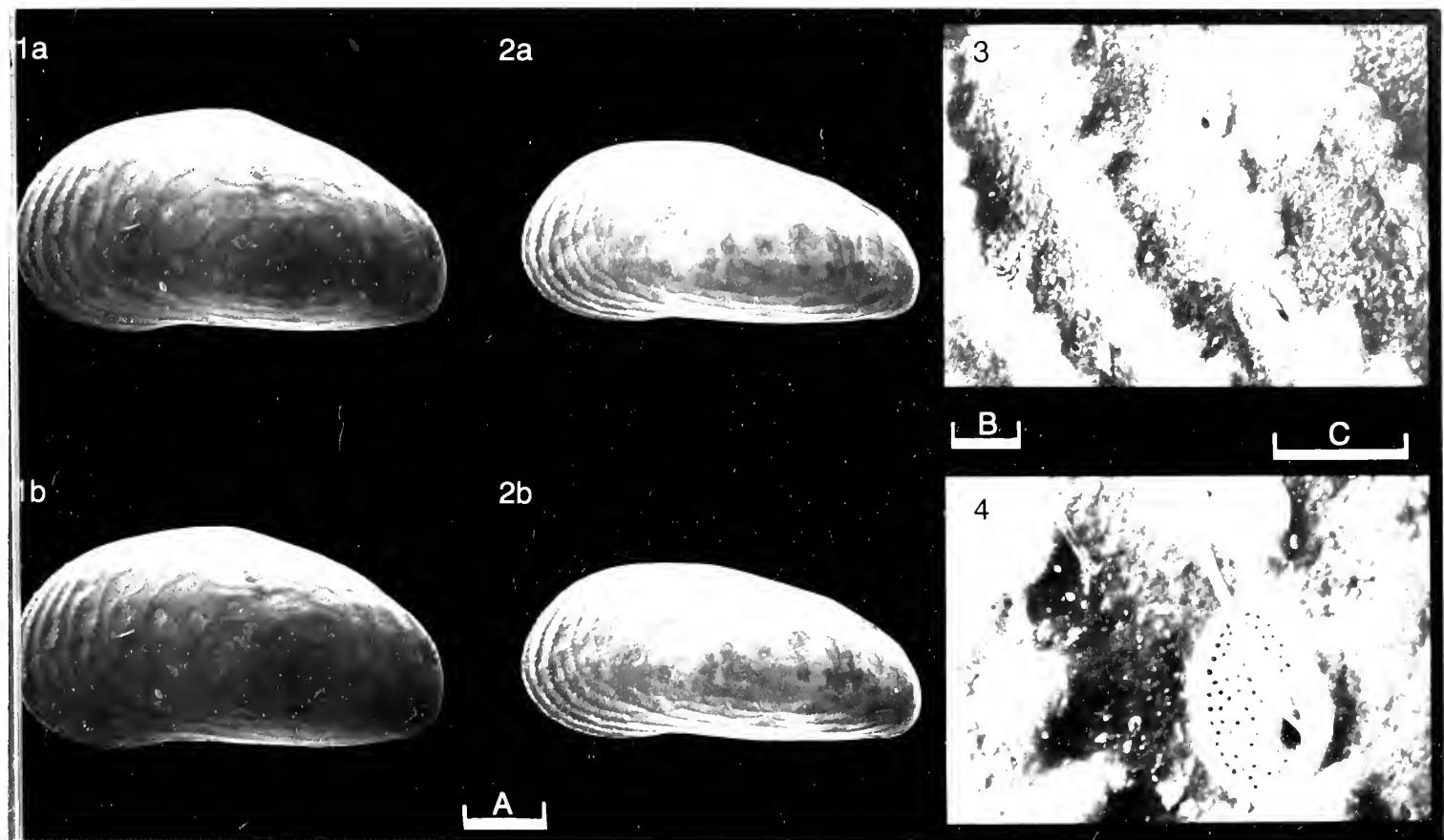
No. **1985.159**, from the South Forties region of the North Sea, depth 73 m, was provided by J. E. Robinson. No. **1986.392** was collected at Sandwich Bay, Kent (approx. lat. 51°18'N, long. 01°25'E) by J. E. Whittaker. The Hancock Museum specimens were all taken from slides in the Brady collection: **1.56.09** (from slide **2.13.05**) is from 20–30 miles off Sunderland, NE England (approx. lat. 55°00'N, long. 01°00'W); **1.56.10** and **1.56.11** (from slide **2.13.04**) are from Hartlepool, NE England (approx. lat. 54°41'N, long. 01°08'W); and **1.56.12** (from slide **2.03.16**) is from Westport Bay (=Clew Bay), W Ireland (approx. lat. 53°50'N, long. 09°40'W). The Hamburg Museum specimen, from Holpe Bank, Baltic Sea (approx. lat. 54°30'N, long. 10°30'E), was selected from Klie's syntypes of *E. undulata* and dissected by DJH; it has been returned to the museum on a separate, labelled slide.

Diagnosis: Carapace with concentric ribbing in anterior and ventral areas. The anterior ribs are more conspicuous and beaded with small tubercles. Sieve-pores particularly prominent. Anterior vestibulum relatively broad. Distal process of male copulatory appendage relatively small and rounded.

Explanation of Plate 13, 74

Fig. 1, ♀ LV, ext. lat. (**1.56.09**, 640 µm long); figs. 2–5, ♂ RV (**1986.392**, 580 µm long): fig. 2, int. lat.; figs. 3, 4, ant. and post. hinge elements; fig. 5, central muscle scar field.

Scale A (100 µm; × 95), figs. 1, 2; scale B (25 µm; × 600), figs. 3, 4; scale C (25 µm; × 400), fig. 5.



Remarks: Klie (1929, *op. cit.*) described a new species, *E. undulata*, from the Baltic Sea, distinguishing it from *E. argus* on the basis of minor differences in carapace outline. Our specimens from Britain and the Baltic closely match Sars' (1925, *op. cit.*) illustrations of *E. argus* in carapace outline, while their male copulatory appendages are identical with those of Klie's syntypes of *E. undulata* (the valves of which are unfortunately decalcified) (see Text-fig. 1). Although the carapace outline of *E. argus* as illustrated by Sars (1925) is more elongate than that of Klie's type illustrations of *E. undulata*, both forms appear to fall within the range of variation seen in our material. Sars did not illustrate the male copulatory appendage of *E. argus*, and although Klie (1938) illustrated a male copulatory appendage of what he regarded as the true *E. argus*, he did not illustrate the carapace of his specimen. In our opinion the differences in outline observed in both carapaces and copulatory appendages are minor and do not warrant the distinction of two species; we therefore regard *E. undulata* as a junior synonym of *E. argus*.

Some of the specimens identified as *E. declivis* by Wagner (1957, *op. cit.*) can be referred to *E. argus* (see Horne & Whittaker, *Stereo-Atlas Ostracod Shells 12*, 1–6, 1985).

Distribution: Recent: a fairly common marine sublittoral species in NW European and Scandinavian waters, having been recorded from the coasts of Britain (Brady, *op. cit.* and herein), the Netherlands (Wagner, *op. cit.*) and Norway (Sars, *op. cit.*), as well as in the Baltic (Klie, *op. cit.*; Rosenfeld, *op. cit.*).

Pleistocene: Britain (Brady, Crosskey & Robertson, *op. cit.*) and eastern Canada (Cronin, *op. cit.*).



Text-fig. 1. *Eucythere argus*. a-c, appendages of ♂ syotype of *E. undulata*; a, copulatory appendages; b, antenna; c, antennula. d-e, ♂ appendages (1.56.11); d, antennula; e, antenna. f, male copulatory appendage (1986.392). g, ♀ RV drawn in transmitted light (1.56.10). h, i, dorsal outlines of RV's: h, ♂ (1.56.12); i, ♀ (1.56.09).

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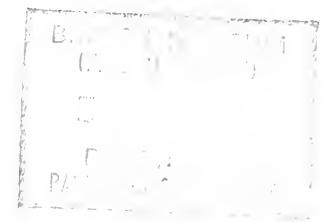
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edited by R. H. Bate, D. J. Horne, J. W. Neale,
and David J. Siveter



Volume 13, Part 2; 30th November, 1986



Published by the British Micropalaentological Society, London

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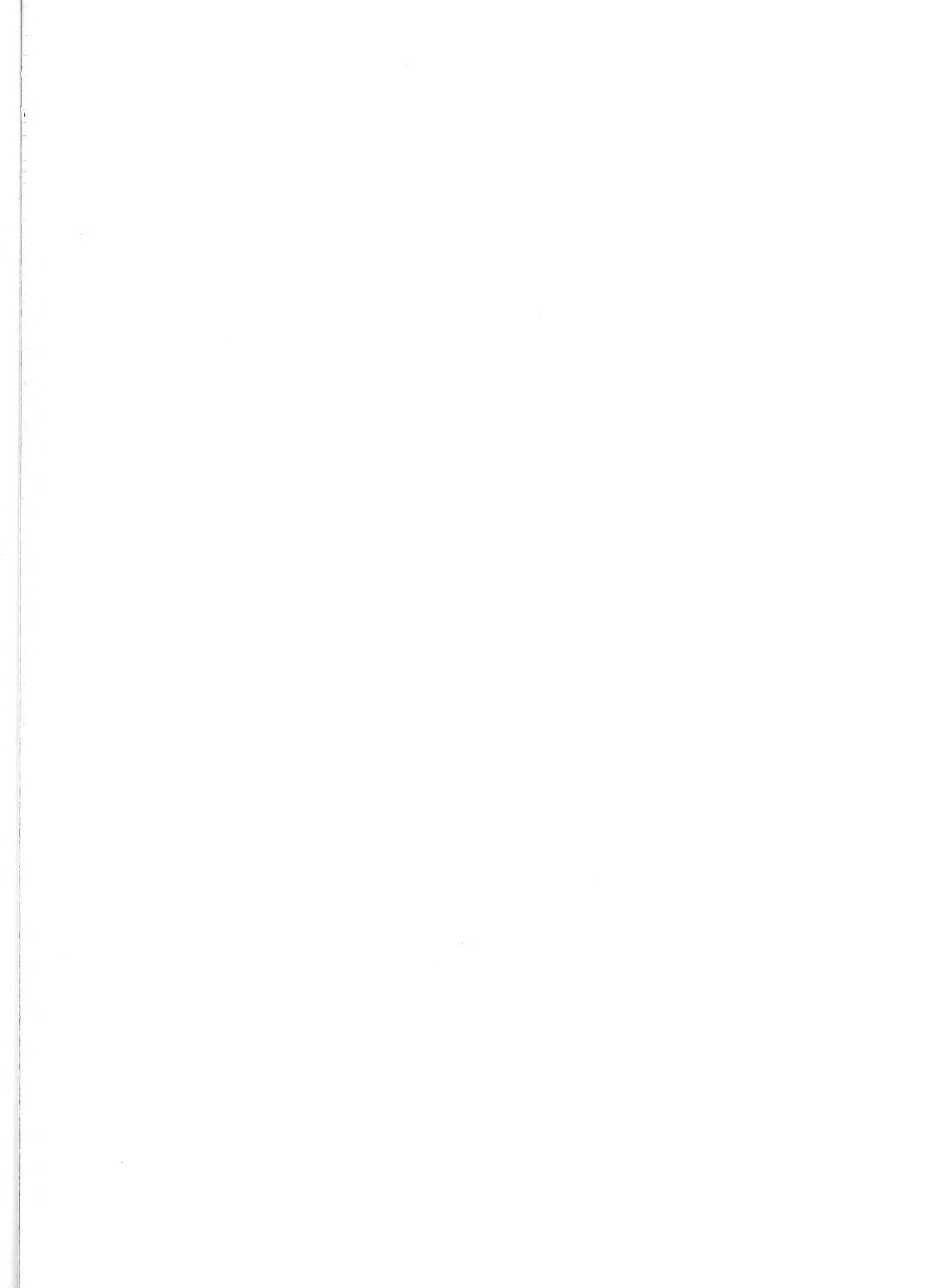
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The front cover shows left valves of a tecnomorph (upper figure; PMO 113.64) and a female (PMO 113.169) of *Slepencia armata* (Henningsmoen, 1954); from the Llandovery Series, Silurian, at Slependen in Asker, Norway. Both specimens are in the Paleontologisk Museum, University of Oslo. See Pollicott & Siveter, *Stereo-Atlas of Ostracod Shells*, 12 (17), 85–92, 1985.



ON AMBOSTRACON EUROPEA MAYBURY & WHATLEY sp. nov.

by Caroline A. Maybury & Robin C. Whatley
(University College of Wales, Aberystwyth)

Ambostracon europea sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12834, ♂ LV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12833, OS 12835 – OS 12838].

Type locality: Mixed sample, Sample No. 1, Vicarage Pit, St. Erth, Cornwall, England (Nat. Grid Ref. SW 556352); Upper Pliocene.

Derivation of name: Latin, with reference to the occurrence of the species in Europe and the first record of the genus (as such) there.

Figured specimens: British Museum (Nat. Hist.) nos. OS 12834 (holotype, ♂ LV:Pl. 13, 78, fig. 1), OS 12835 (paratype, ♂ RV:Pl. 13, 78, fig. 2), OS 12833 (paratype, ♀ LV:Pl. 13, 78, fig. 3, Pl. 13, 80, fig. 4), OS 12836 (paratype, ♂ LV:Pl. 13, 80, fig. 1), OS 12838 (paratype, juv. RV:Pl. 13, 80, fig. 2), OS 12837 (paratype, juv. LV:Pl. 13, 80, fig. 3). All paratypes from the type locality and type horizon with the exception of specimen OS 12833 which is from a sample of shell-rich sand, Le Temple du Cerisier, SW of Rennes (approx. lat. 48° 07'N, long. 1° 41'W), NW France; Upper Pliocene, Redonian (see C. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and North West France*, unpubl. PhD thesis, Univ. Wales, 1, 3-29, 1985 for sample details).

Diagnosis: A very large species of *Ambostracon* characterised by prominent costae, well developed intercostate pore conuli and a weakly developed reticulum. The posterodorsal costa is curved and terminates below and just behind the eye tubercle and the anterodorsal costa is submarginal and

Explanation of Plate 13, 78

Figs. 1, ♂ LV, ext. lat. (holotype, OS 12834, 1,000 µm long); fig. 2, ♂ RV, ext. lat. (paratype, OS 12835, 1,000 µm long); fig. 3, ♀ LV, ext. lat. (paratype, OS 12833, 820 µm long).

Scale A (200 µm; × 66), figs. 1-3.

Diagnosis (contd.): extends from the mid-dorsal area of the valve through the eye tubercle to mid-anterior. The median costa is bifurcate anteriorly and is interrupted anteromedianly by an irregularly-shaped tubercle. The ventral costa is gently curved and is parallel to the median costa. Anteriorly and caudally there is a narrow, frill-like flange. Marginal pore canals numerous, simple, straight and entire. Hinge holamphidont. Central muscle scars anteromedian in position, comprising a near vertical row of 4 adductors with the dorsomedian scar divided and 3 subcircular frontal scars in a slightly curved row. There are 3 dorsal scars close to the anterior section of the hinge's median element and a suboval fulcral point situated above and between the adductor and frontal scar rows.

Remarks: This species resembles *Elofsonella amberii* Carbonnel, 1969 (in: J. W. Neale (ed.), *The Taxonomy, Morphology and Ecology of Recent Ostracoda*, 85-92, pl. 1, Oliver & Boyd, Edinburgh); a Tortonian (Upper Miocene) species from the Rhône Valley which clearly belongs to *Ambostracon*. The disposition of the costae is similar in both species; but in *A. europea* they are less robust and more 'blade like'. The two species also differ in size (*Elofsonella amberii*, ♂ 725 µm long, ♀ 690 µm long) and in intercostate ornamental detail. Although the ornament of the latter species is highly variable none of the variants which Carbonnel describes closely approach the morphology of *A. europea*.

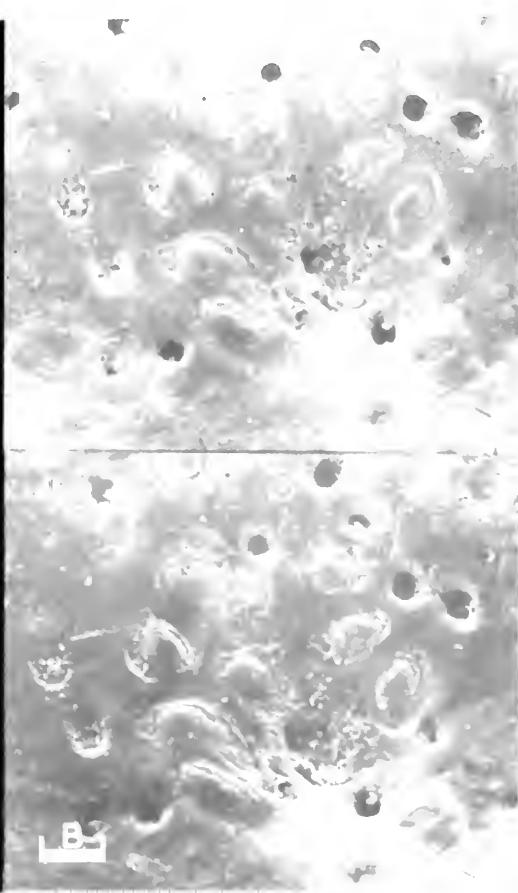
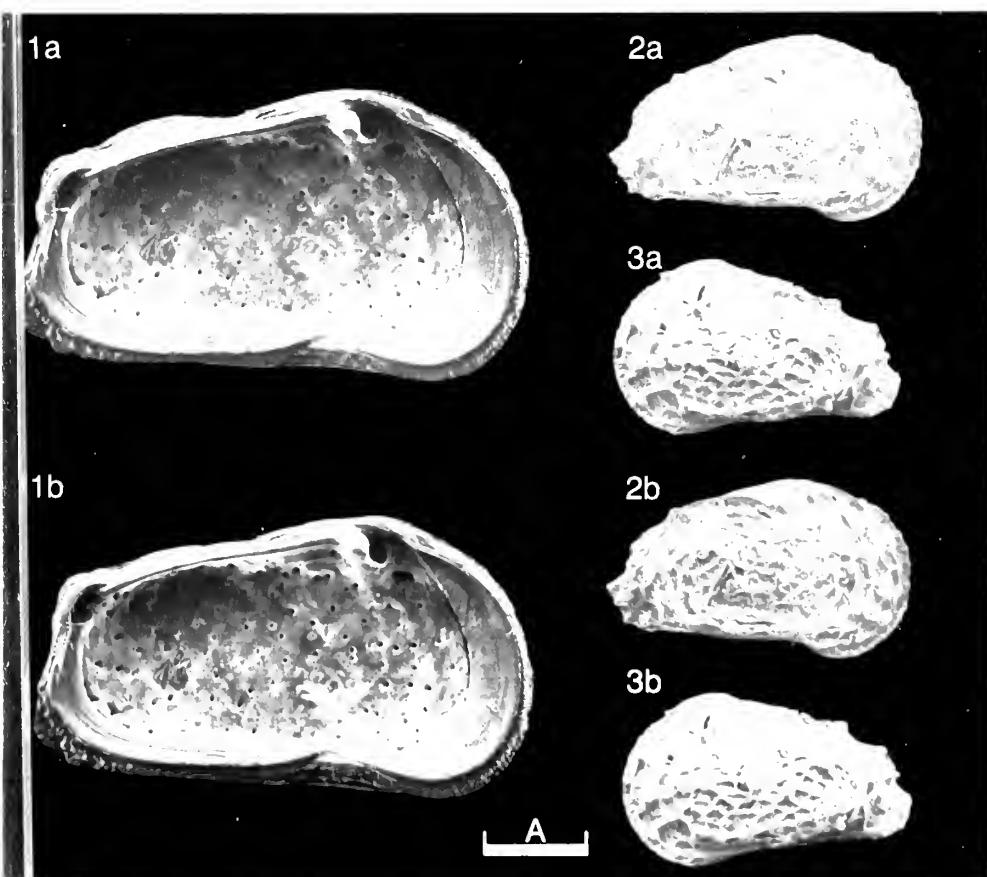
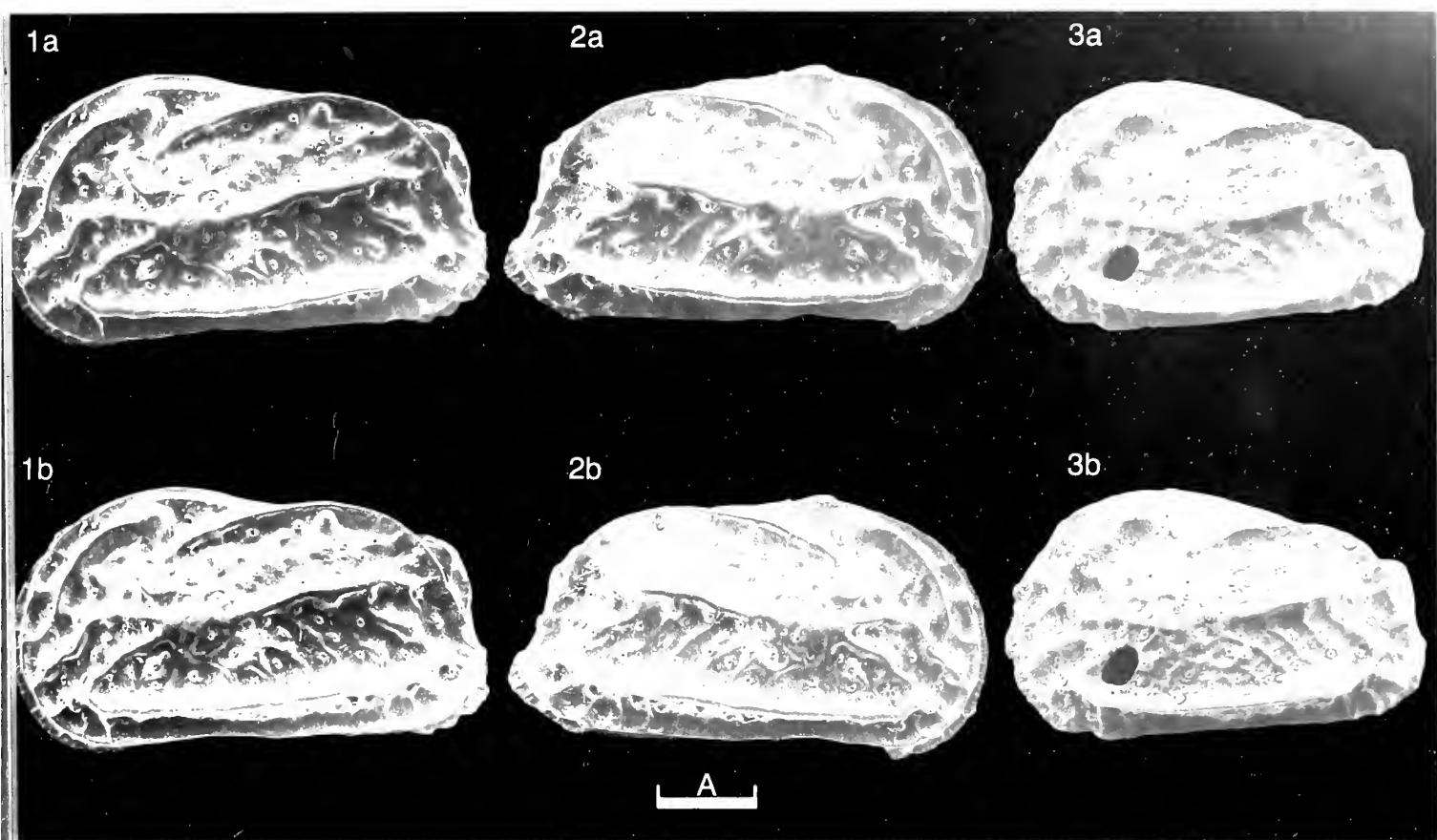
Species of *Ambostracon* have been recorded from the Americas, South Africa, Australia, Japan and ? Turkey (V. H. Valicenti, *Sixth Intern. Ostracod Symposium, Saalfelden*, 97, 1977). A total of seven species (four occurring in the Upper Pliocene deposits of St. Erth and NW France and three apparently confined to NW France) have been recovered by the authors, making this the first record of the genus, as such, in Europe.

Distribution: *Ambostracon europea* has been recorded from the Redonian deposits of Le Temple du Cerisier, Gîte d'Apigné, Apigné (Borehole II), L'Orchère Pincourt and a mixed sample from NW France; in addition to the Upper Pliocene deposits of St. Erth (Sample Nos. 1,7,14,22-23, 27-29). See Maybury, *op. cit.* for sample details.

Explanation of Plate 13, 80

Fig. 1, ♂ LV, int. lat. (paratype, OS 12836, 1,200 µm long); fig. 2, juv. RV, ext. lat. (paratype, OS 12838, 610 µm long); fig. 3, juv. LV, ext. lat. (paratype, OS 12837, 570 µm long); fig. 4, ♀ LV, musc. sc. (paratype, OS 12833, 820 µm long).

Scale A (200 µm; × 66), figs. 1-3; scale B (10 µm; × 330), fig. 4.



ON AMBOSTRACON COSTAFORMA WHATLEY & MAYBURY sp. nov.

by Robin C. Whatley & Caroline A. Maybury
(University College of Wales, Aberystwyth)

Ambostracon costaforma sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12110, ♀ LV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12111 – OS 12113].

Type locality: Shell-rich sand, Le Temple du Cerisier, SW of Rennes (approx. lat. 48° 07'N, long. 1° 41'W), NW France; Upper Pliocene, Redonian.

Derivation of name: Latin, referring to the prominent ornamental ridges of this species.

Figured specimens: British Museum (Nat. Hist.) nos. OS 12110 (holotype, ♀ LV:Pl. 13, 82, fig. 1), OS 12111 (paratype, ♂ LV:Pl. 13, 82, fig. 2), OS 12112 (paratype, ♂ RV:Pl. 13, 82, fig. 3), OS 12113 (paratype, ♂ RV:Pl. 13, 84, fig. 1), OS 12114 (paratype, juv. RV:Pl. 13, 84, fig. 2), OS 12115 (paratype, ♂ LV:Pl. 13, 84, figs. 3,4). All from the type locality and type horizon.

Diagnosis: A large, subrectangular species of *Ambostracon* with a prominent curved, ocular ridge and conspicuous dorsal, median and ventral costae. The anterodorsal and posterodorsal costae are curved and both overhang the dorsal margin. The anterodorsal costa passes behind and is obscured by the posterodorsal costa; the latter is continuous with the median costa. There is a relatively narrow break in the median costa anteromedianly (in the position of the central muscle scar field) and posteriorly, just above the caudal process, is a short, blunt spine. Intercostally the lateral surface is reticulate.

Explanation of Plate 13, 82

Fig. 1, ♀ LV, ext. lat. (holotype, OS 12110, 810 µm long); fig. 2, ♂ LV, ext. lat. (paratype, OS 12111, 810 µm long); fig. 3, ♀ RV, ext. lat. (paratype, OS 12112, 810 µm long).

Scale A (200 µm; × 73), figs. 1-3.

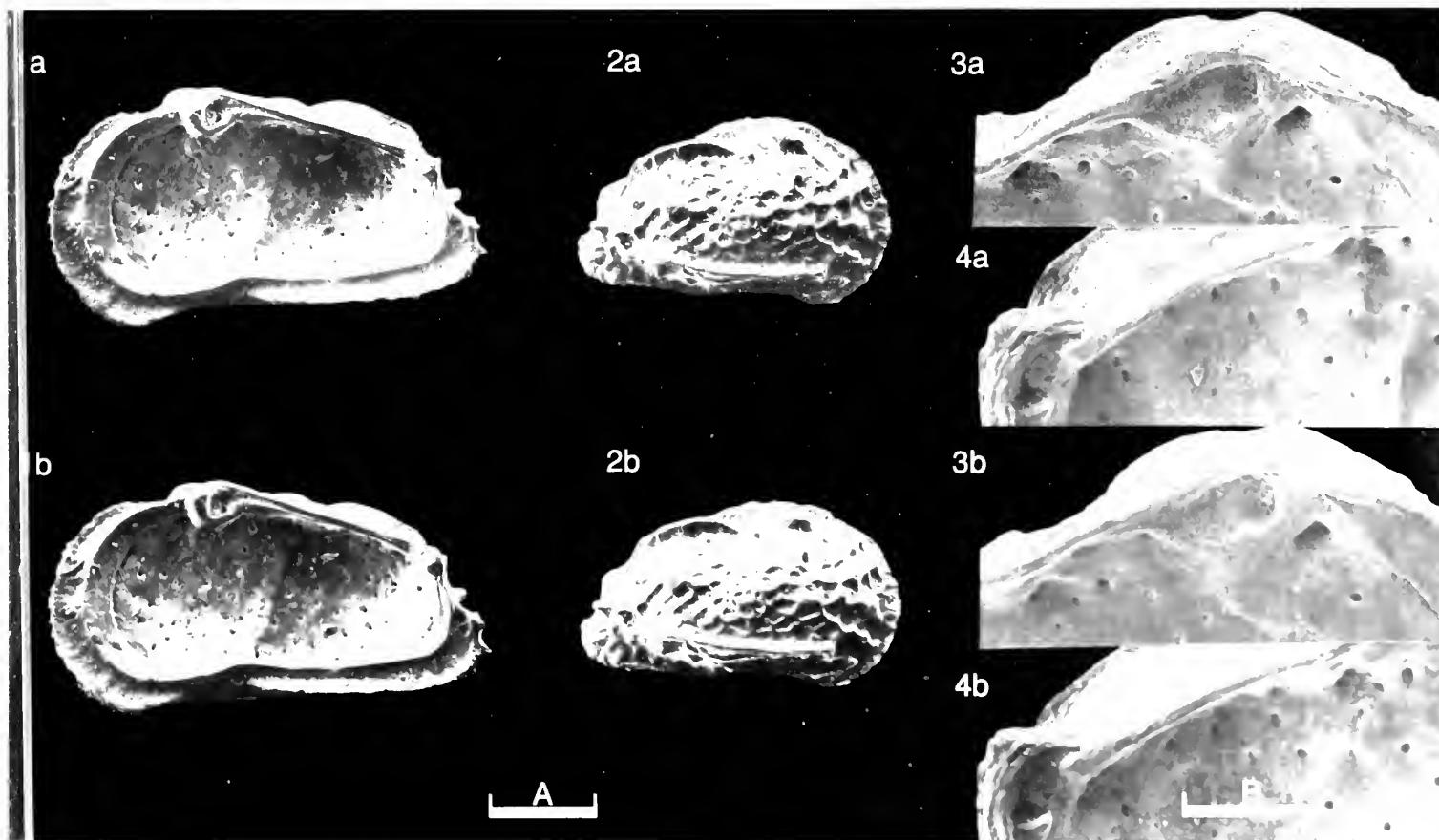
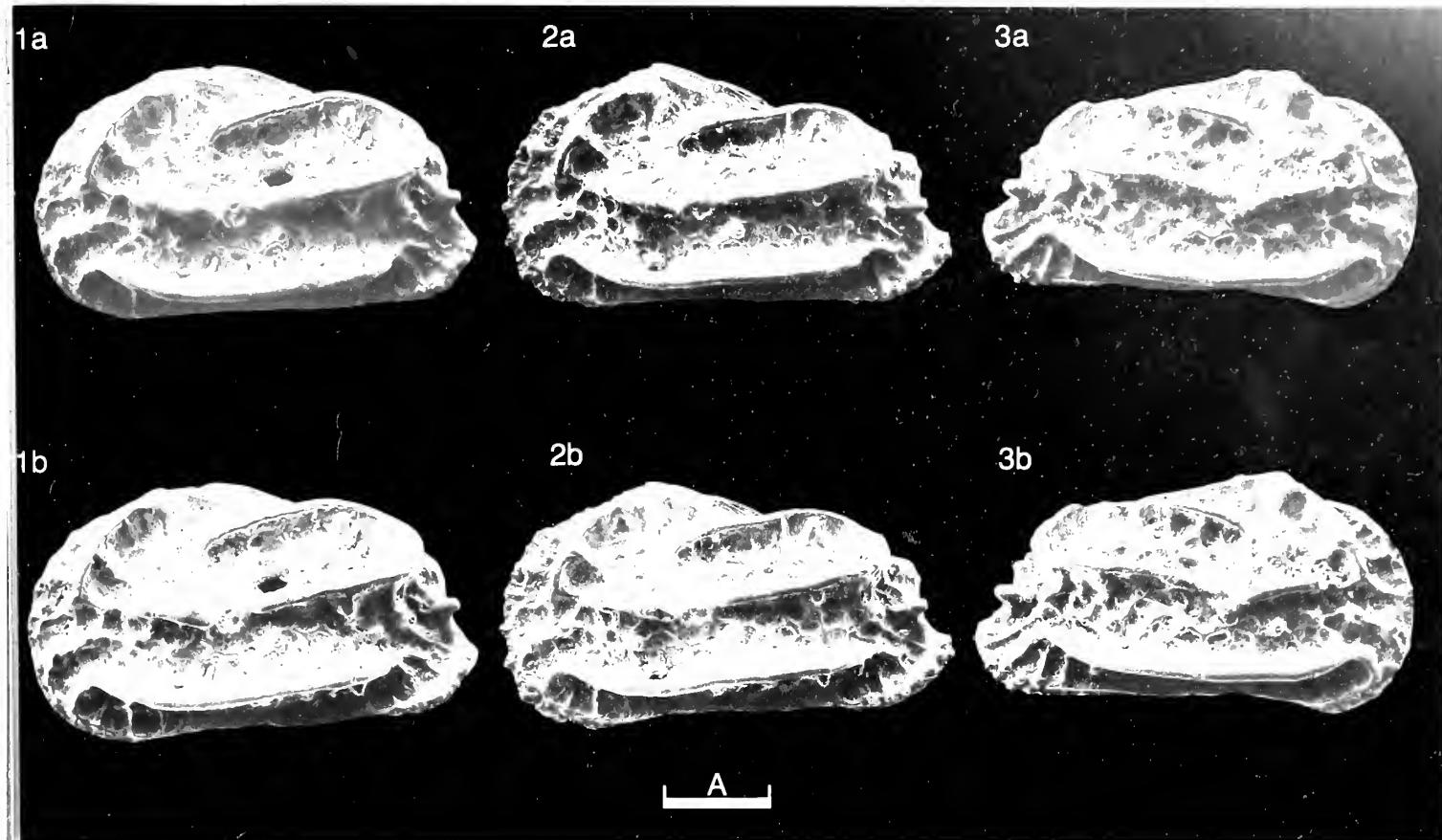
Remarks: The juxtaposition of the costae of this species is similar to that of *A. europea* Maybury & Whatley (*Stereo-Atlas Ostracod Shells*, 13, 77-80, 1986). The median ridge in the latter species, however, is somewhat expanded anteromedianly to form a tubercle; unlike that of *A. costaforma* which possesses a narrow break in its length. In *A. europea* the median ridge is bifurcate anteriorly, whereas that of *A. costaforma* does not divide. Pore conuli are more numerous on *A. costaforma*.

Distribution: In addition to its occurrence at the type locality in France, this species has also been recovered from the Upper Pliocene deposits at St. Erth (Sample No. 1) (See J. -P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, 1, 8-26, 1968 and C. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and North West France*, unpubl. PhD thesis, Univ. Wales, 1, 4-5, 1985 for further details of the samples from France and Britain respectively).

Explanation of Plate 13, 84

Fig. 1, ♂ RV, int. lat. (paratype, OS 12113, 790 µm long); fig. 2, juv. RV, ext. lat. (paratype, OS 12114, 580 µm long); figs. 3,4, ♂ LV, (paratype, OS 12115, 770 µm long); fig. 3, ant. hinge element; fig. 4, post. hinge element.

Scale A (200 µm; × 73), figs. 1,2; scale B (100 µm; × 185), fig. 3,4.



ON AMBOSTRACON DELICATA WHATLEY & MAYBURY sp. nov.

by Robin C. Whatley & Caroline A. Maybury
(University College of Wales, Aberystwyth)

Ambostracon delicata sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12910, ♀ LV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12911 – OS 12913].

Type locality: Grey marl, depth 2-7m, The Martineau Pit on the South facing slope of the Petite Boulon Valley, Palluau I (approx. lat. 46° 48'N, long. 1° 37'W), near Le Pas, NW France; Upper Pliocene, Redonian.

Derivation of name: Latin, from the delicate nature of the reticulum of this species.

Figured specimens: British Museum (Nat. Hist.) nos. OS 12910 (holotype, ♀ LV:Pl. 13, 86, fig. 1; Pl. 13, 88, figs. 2-3), OS 12911 (paratype, ♀ RV:Pl. 13, 86, fig. 2; Pl. 13, 88, fig. 4), OS 12912 (paratype, ♂ LV:Pl. 13, 86, fig. 3), OS 12913 (paratype, juv. RV:Pl. 13, 88, fig. 1). Specimen OS 12912 from the type locality and type horizon; specimen OS 12911 from fine, glauconitic, grey sand, depth 26.7 - 32.4m, Apigné (Borehole II), SW of Rennes (approx. lat. 48° 07'N, long. 1° 41'W), NW France; and specimen OS 12913 from light-grey fine to medium grained sand, Le Bosq d'Aubigny (approx. lat. 49° 07'N, long. 1° 05'W), near St. Lô, NW France; all Upper Pliocene, Redonian. (See J. -P. Margerel, *Les Foraminifères du Redonien, Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, 1, 8-26, 1968 for further geographical and sample details).

Diagnosis: A medium to large species of *Ambostracon* with a strongly developed ocular ridge, but a rather inconspicuous eye tubercle. The median costa bifurcates anterior of the weakly developed subcentral tubercle and the resultant rami are parallel. Intercostate reticulum well developed with its dominant component obliquely disposed posteroventrally.

Explanation of Plate 13, 86

Fig. 1, ♀ LV, ext. lat. (holotype, OS 12910, 710 µm long); fig. 2, ♀ RV, ext. lat. (paratype, OS 12911, 680 µm long); fig. 3, ♂ LV, ext. lat. (paratype, OS 12912, 660 µm long). Scale A (200 µm; × 85), figs. 1-3.

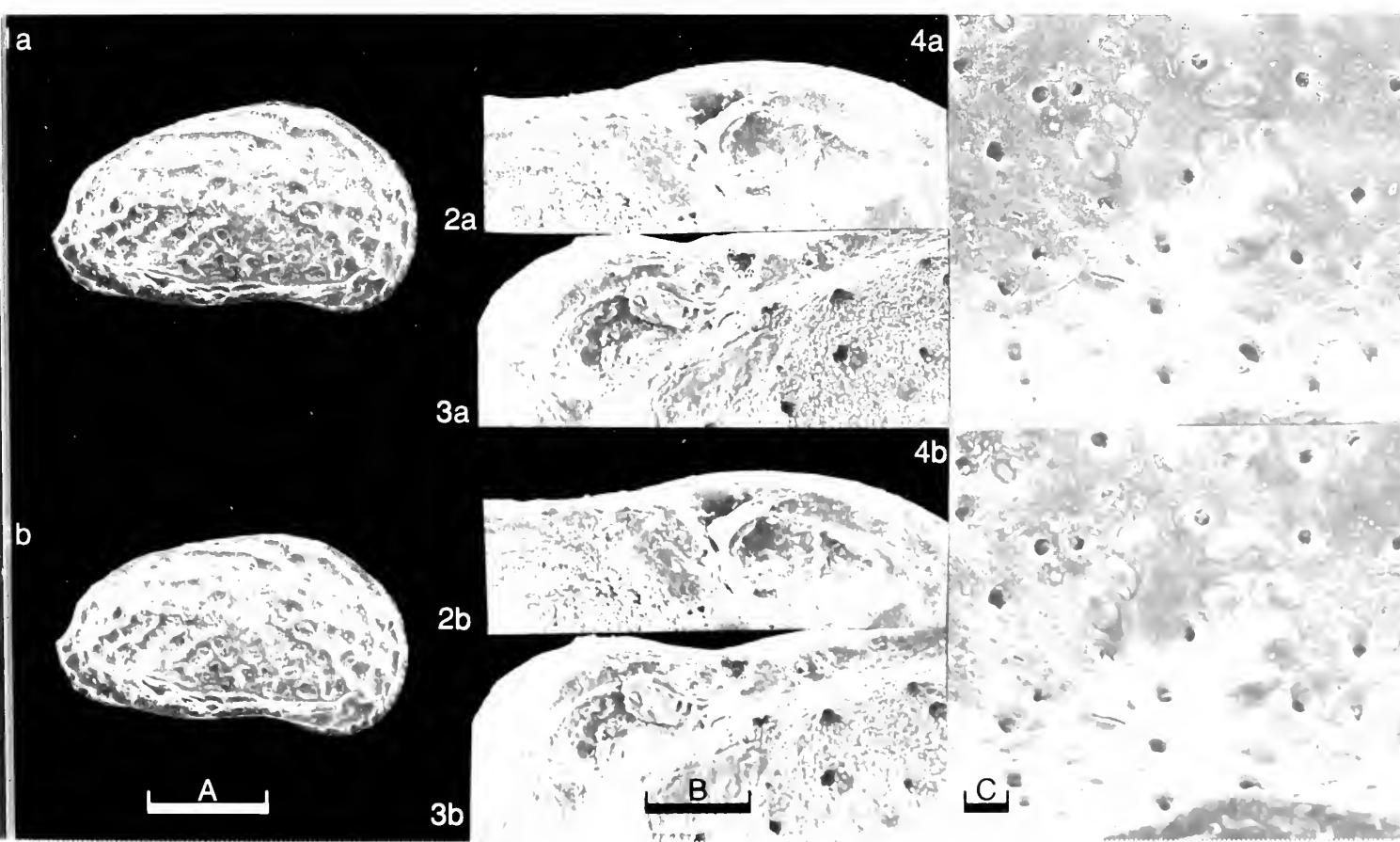
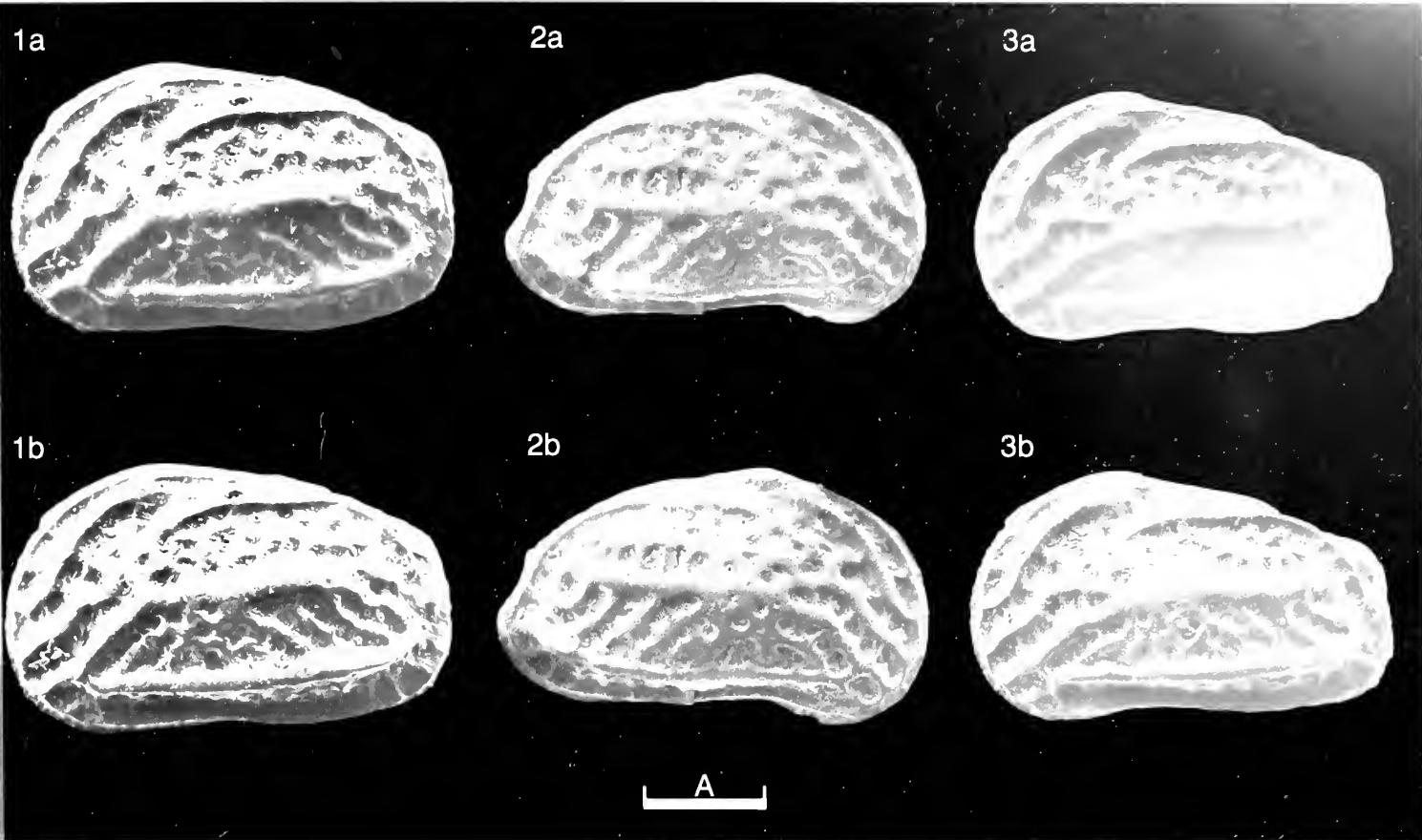
Remarks: This species is similar to *Ambostracon perfecta* Maybury & Whatley (*Stereo-Atlas Ostracod Shells*, 13, 89-92, 1986). The two species are costate and reticulate; but in *A. perfecta* the reticulae are more regularly defined and the costae less pronounced than in *A. perfecta*, and whereas the ocular ridge of *A. perfecta* is continuous with the ventral costa, it terminates anteromarginally at about mid-height in *A. delicata*.

Distribution: This species is a rare constituent of the Redonian, Upper Pliocene faunas of Apigné (Borehole II), Le Temple du Cerisier, Le Bosq d'Aubigny and Palluau I, NW France.

Explanation of Plate 13, 88

Fig. 1, juv. RV, ext. lat. (paratype, OS 12913, 610 µm long); figs. 2, 3, ♀ LV (holotype, OS 12910, 710 µm long); fig. 2, ant. hinge element; fig. 3, post. hinge element; fig. 4, ♀ RV, musc. sc. (paratype, OS 12911, 680 µm long).

Scale A (200 µm; × 85), fig. 1; scale B (40 µm; × 352), figs. 2, 3; scale C (20 µm; × 310), fig. 4.



ON AMBOSTRACON PERFECTA MAYBURY & WHATLEY sp. nov.

by Caroline A. Maybury & Robin C. Whatley
(University College of Wales, Aberystwyth)

Ambostracon perfecta sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12105, ♀ RV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12106 – OS 12109].

Type locality: Fine glauconitic, grey sand between 26.7-32.4m, Apigne (Borehole II), SW of Rennes (approx. lat. 48° 07'N, long. 1° 41'W), NW France; Upper Pliocene, Redonian.

Derivation of name: Latin, from the pleasingly regular form of the ornament of this species.

Figured specimens: British Museum (Nat. Hist.) nos. OS 12105 (holotype, ♀ RV:Pl. 13, 90, fig. 1), OS 12106 (paratype, ♂ LV:Pl. 13, 90, fig. 2), OS 12107 (paratype, ♂ RV:Pl. 13, 90, fig. 3), OS 12108 (paratype, ♂ RV:Pl. 13, 92, figs. 1,3), OS 12109 (paratype, juv. LV:Pl. 13, 92, fig. 2). Specimens OS 12107 and OS 12109 are from Le Temple du Cerisier (approx. lat. 48° 07'N, long. 1° 41'W) and Le Bosq d'Aubigny (approx. lat. 49° 07'N, long. 1° 05'W), NW France; Upper Pliocene, Redonian) respectively. The remaining specimens are from the type locality and type horizon.

Diagnosis: A large, regularly reticulate species of *Ambostracon* with two obliquely disposed posterodorsal ribs between the curved posterodorsal costa and poorly defined posteromedian costa. Ocular ridge continuous with the longitudinal ventral costa. Subcentral tubercle marked by the presence of fossae with irregularly-shaped outlines.

Explanation of Plate 13, 90

Fig. 1, ♀ RV, ext. lat. (holotype, OS 12105, 740 µm long); fig. 2, ♂ LV, ext. lat. (paratype, OS 12106, 760 µm long); fig. 3, ♂ RV, ext. lat. (paratype, OS 12107, 770 µm long);

Scale A (200 µm; × 83), figs. 1-3.

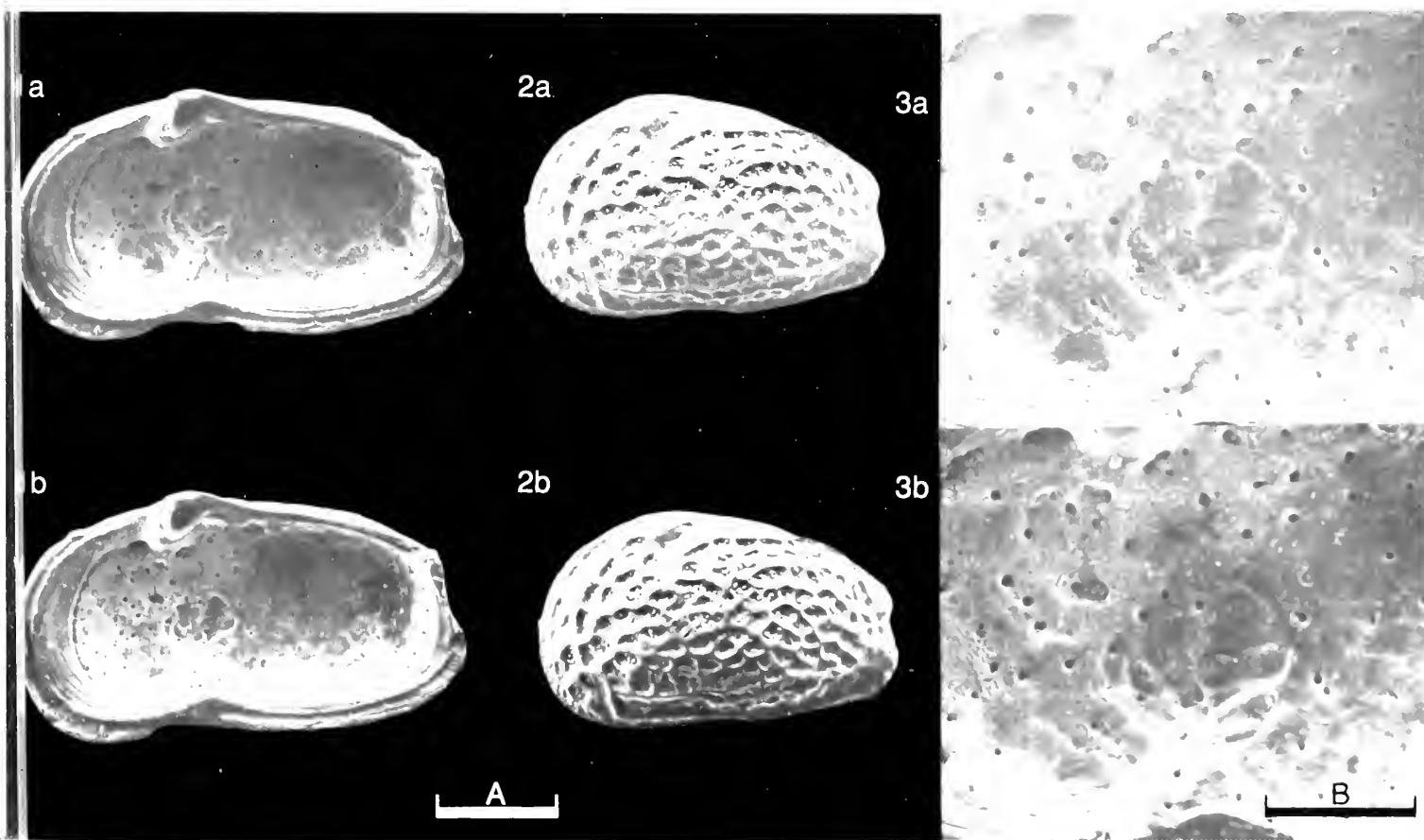
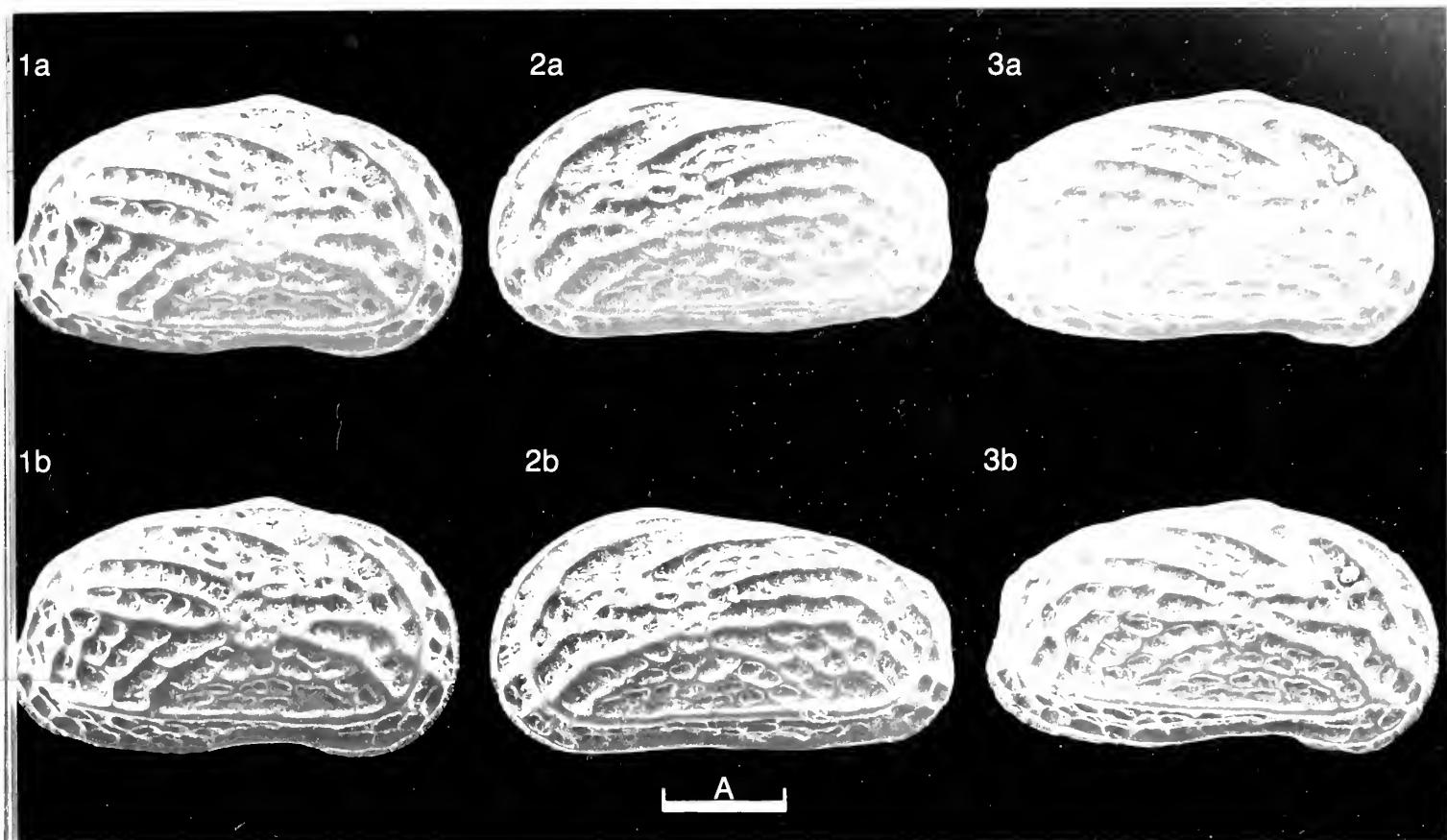
Remarks: This species resembles *A. hulingsi* McKenzie & Swain (*Jour. Pal. Tulsa, Okla.*, 41 (2), 292, pl. 29, fig. 13, text-fig. 16, 1967), a Recent species from Scammon Lagoon, on the coast of California. The two species differ in size, shape and ornament, *A. perfecta* being larger and possessing a more regularly disposed reticulum. The dorsal marginal 'bulge' in *A. hulingsi* is directly above the eye spot, whereas it is posterior to the eye spot in the present species and occurs only in the RV.

Distribution: Upper Pliocene, Redonian of NW France at Apigne (Gîte d'Apigne, Borehole II), Le Bosq d'Aubigny, Le Temple du Cerisier and Palluau I (see J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, 1, 8-26, 1968 for geographical and stratigraphical details) and Upper Pliocene of St. Erth (Sample Nos. 1, 14, 18 and 29), Cornwall, England (see C. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene, Benthonic Ostracoda from St. Erth and North West France*, unpubl. PhD thesis, Univ. Wales, 1, 4-5, 1985 for further details of the samples from Britain).

Explanation of Plate 13, 92

Figs. 1,3, ♂ RV (paratype, OS 12108, 760µm long); fig. 1, int. lat; fig. 3, musc. sc.; fig. 2, juv. LV, int. lat. (paratype OS 12109, 600µm long).

Scale A (200µm; × 83) figs. 1,2; scale B (100µm; × 205) fig. 3.



ON ROUNDSTONIA MAGNA MAYBURY & WHATLEY sp. nov.

by Caroline A. Maybury & Robin C. Whatley
(University College of Wales, Aberystwyth)

Roundstonia magna sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12896, ♀ LV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12897 – OS 12901].

Type locality: Fine glauconitic, grey sand, depth 26.7 - 32.4m, Apigné (Borehole II), SW of Rennes (approx. lat. 48° 07'N, long. 1° 41'W) NW France; Upper Pliocene, Redonian.

Derivation of name: Latin, alluding to the comparatively large size of this species with respect to the type species, *Roundstonia globulifera* (Brady, 1868). (*Trans. Linn. Soc. Lond.*, 26, 406, pl.31, fig. 42).

Figured specimens: British Museum (Nat. Hist.) nos. OS 12896 (holotype, ♀ LV:Pl. 13, 94, fig. 1), OS 12897 (paratype, ♂ RV:Pl. 13, 94, fig. 2), OS 12898 (paratype, ♂ RV:Pl. 13, 94, fig. 3), OS 12899 (paratype, ♂ RV:Pl. 13, 96, fig. 1), OS 12900 (paratype, ♀ car.: Pl. 13, 96, fig. 2), OS 12901 (paratype, ♂ car.: Pl. 13, 96, fig. 3). All paratypes from the shell-rich sand of Le Temple du Cerisier, SW of Rennes (approx. lat. 48° 07'N, long. 1° 41'W), NW France; except for specimen OS 12899 which is from the coarse, shell-rich, argillaceous, grey sand of L'Aubier, SE of the Grand-Landes forest on the right bank of the river Grande-Villeneuve (approx. lat. 46° 54'N, long. 1° 37'W), NW France: Upper Pliocene, Redonian.

Explanation of Plate 13, 94

Fig. 1, ♀ LV, ext. lat. (holotype, OS 12896, 600 µm long); fig. 2, ♀ RV, ext. lat. (paratype, OS 12897, 560 µm long); fig. 3, ♂ RV, ext. lat. (paratype, OS 12898, 610 µm long).

Scale A (200 µm; × 100), figs. 1-3.

Diagnosis: A medium-sized species of *Roundstonia* with a reticulate ornament of subcircular fossae and wide, smooth muri. Large, tubercular sub-alar process in female, more subdued in male; anterodorsal tumescence below eye tubercle, also more prominent in female. Median element of gongylodont hinge smooth.

Remarks: This species and *Roundstonia minima* Whatley & Maybury (*Stereo-Atlas Ostracod Shells*, 13, 97-100, 1986) are included in Neale's hitherto monotypic genus, *Roundstonia* (*Revue Micropaléont.*, 16(2), 125-131, 1973). His generic diagnosis, however, is slightly emended to incorporate these two species which are notably smaller and larger respectively than the type species and which, while possessing undulose to subnodose surfaces, are not noded in the same manner as *R. globulifera* and possess a smooth median hinge element.

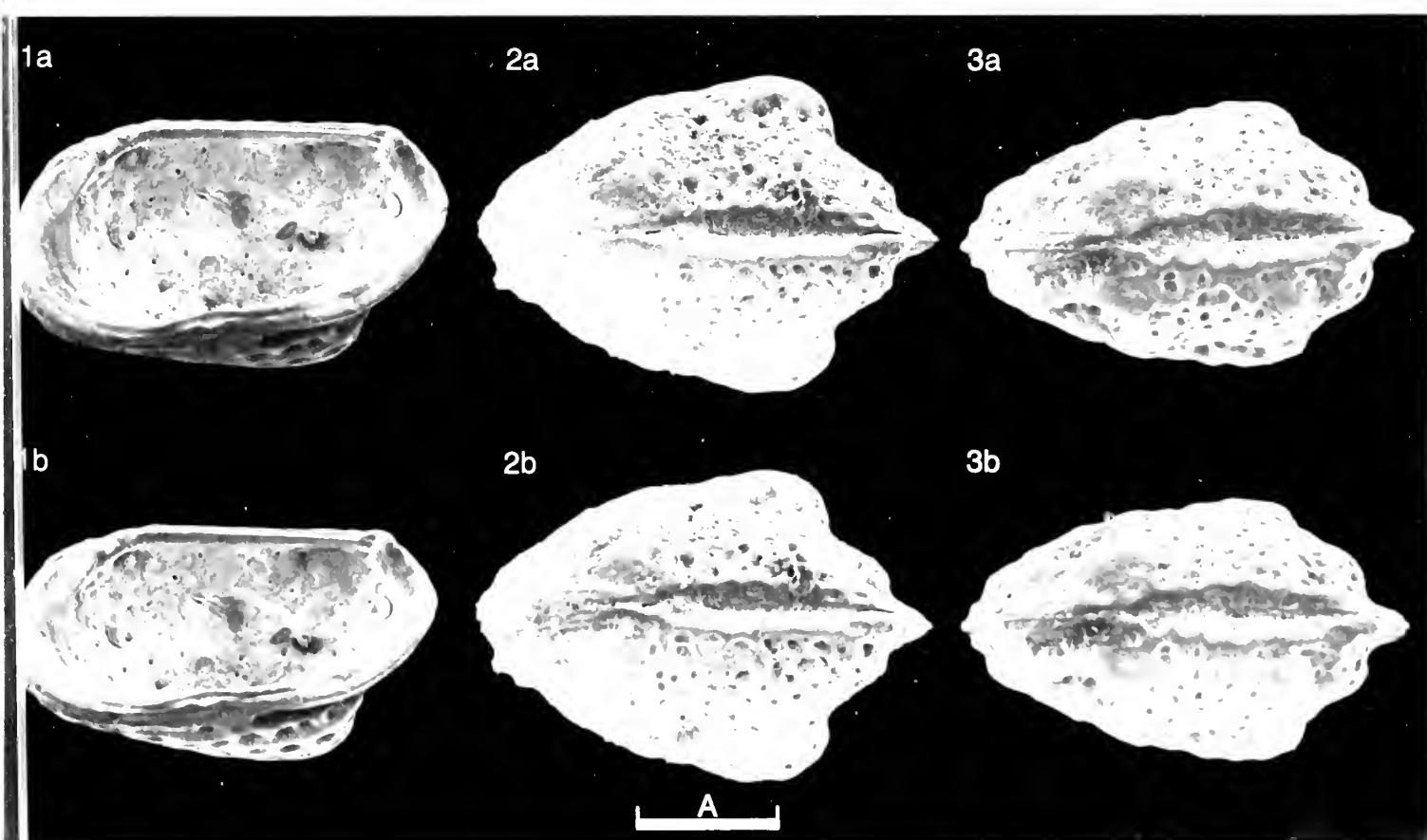
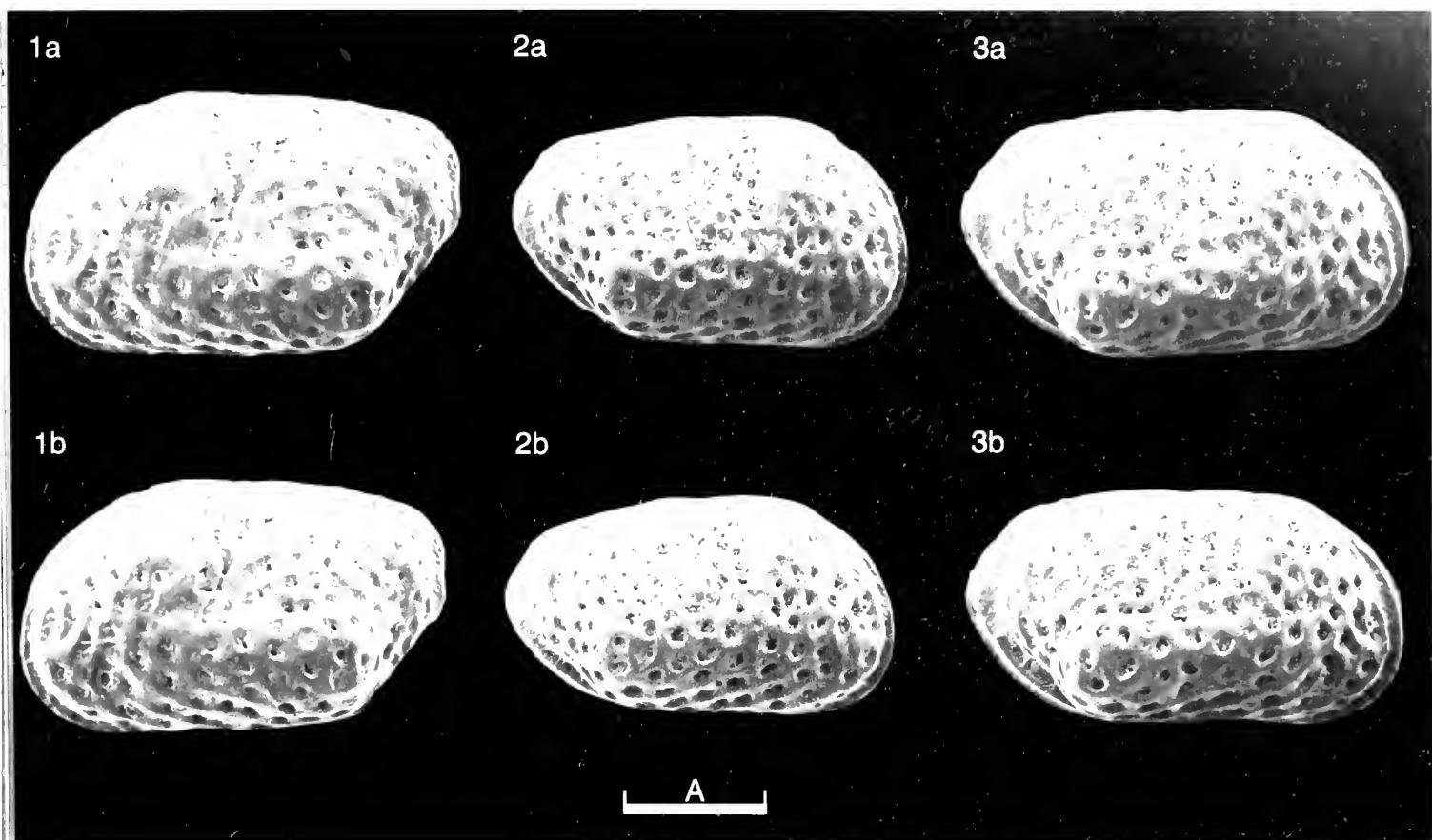
R. magna differs from the type species in size (the holotype ♂ LV of *R. globulifera* is 467 µm long), in its coarser reticulation and its lack of weakly developed crenulae on the median hinge element. It also lacks the details of the nodose exterior of *R. globulifera*, although its surface is somewhat undulose and is swollen in approximately the same areas as the nodes occur on *R. globulifera*.

Distribution: The species has been recovered from the Redonian, U. Pliocene deposits of Apigné (Gîte d'Apigné, Borehole II, Le Temple du Cerisier) and L'Aubier, NW France (see J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, 1, 8-26, 1968 for geographical, stratigraphical and sample details).

Explanation of Plate 13, 96

Fig. 1, ♂ RV, int. lat. (paratype, OS 12899, 610 µm long); fig. 2, ♀ car., ext. dors. (paratype, OS 12900, 610 µm long); fig. 3, ♂ car., ext. dors. (paratype, OS 12901, 620 µm long).

Scale A (200 µm; × 100), figs. 1-3.



ON ROUNDSTONIA MINIMA WHATLEY & MAYBURY sp. nov.

by Robin C. Whatley & Caroline A. Maybury
(University College of Wales, Aberystwyth)

Roundstonia minima sp. nov.

Holotype: British Museum (Nat. Hist.) no. OS 12902, LV.

[Paratypes: British Museum (Nat. Hist.) nos. OS 12903 – OS 12904].

Type locality: Mixed sample, Sample No. 1, Vicarage Pit, St. Erth, Cornwall, England (Nat. Grid Ref. SW 556352); Upper Pliocene.

Derivation of name: Latin, referring to the very small size (300 μ m long) of the adults of this species.

Figured specimens: British Museum (Nat. Hist.) nos. OS 12902 (holotype, LV: Pl. 13, 98, figs. 1,3; Pl. 13, 100, fig. 4), OS 12903 (paratype, RV: Pl. 13, 98, figs. 2,4), OS 12904 (paratype, RV: Pl. 13, 100, figs. 1-3). Specimens OS 12903 and OS 12904 from the type locality and type horizon, sample nos. 28 and 2 respectively. (See C. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and North West France*, unpubl. PhD thesis, Univ. Wales, 1, 4-5, 1985 for sample details).

Diagnosis: A very small cuneiform species of *Roundstonia* with subrounded cardinal angles. The lateral surface is undulose, reticulate and bears a boss-like sub-alar node posteroventrally and further poorly developed subnodose areas anterodorsally and posterodorsally. From the anterodorsal subnodose area a sinuous rib extends anteroventrally. The selvage is prominent ventrally and the gongylodont hinge of the RV possesses an ant. terminal socket which is comma-shaped and arches over a weakly defined, boss-like tooth; median element smooth.

Explanation of Plate 13, 98

Figs. 1,3, LV (holotype, OS 12903, 300 μ m long): fig. 1, ext. lat.; fig. 3, ext. obl.; figs. 2,4, RV (paratype, OS 12903, 300 μ m long): fig. 2, ext. lat.; fig. 4, ext. vent.

Scale A (100 μ m; \times 200), figs. 1-4.

Remarks: This species resembles *Roundstonia magna* Maybury & Whatley (*Stereo-Atlas Ostracod Shells*, 13, 93-96, 1986) internally and in the overall configuration of its ornament and undulose nature of its lateral surfaces. The two species differ in size, lateral outline (the valves of *R. minima* are more tapered towards the posterior than those of *R. magna*) and in ornamental detail (the muri of *R. minima* are absolutely and relatively wider and the fossae smaller than those of *R. magna* and the former species possesses a distinct, curved, anteroventral rib which is absent in the latter). In addition, the marginal rim of *R. magna* is clearly defined, but inconspicuous in *R. minima*.

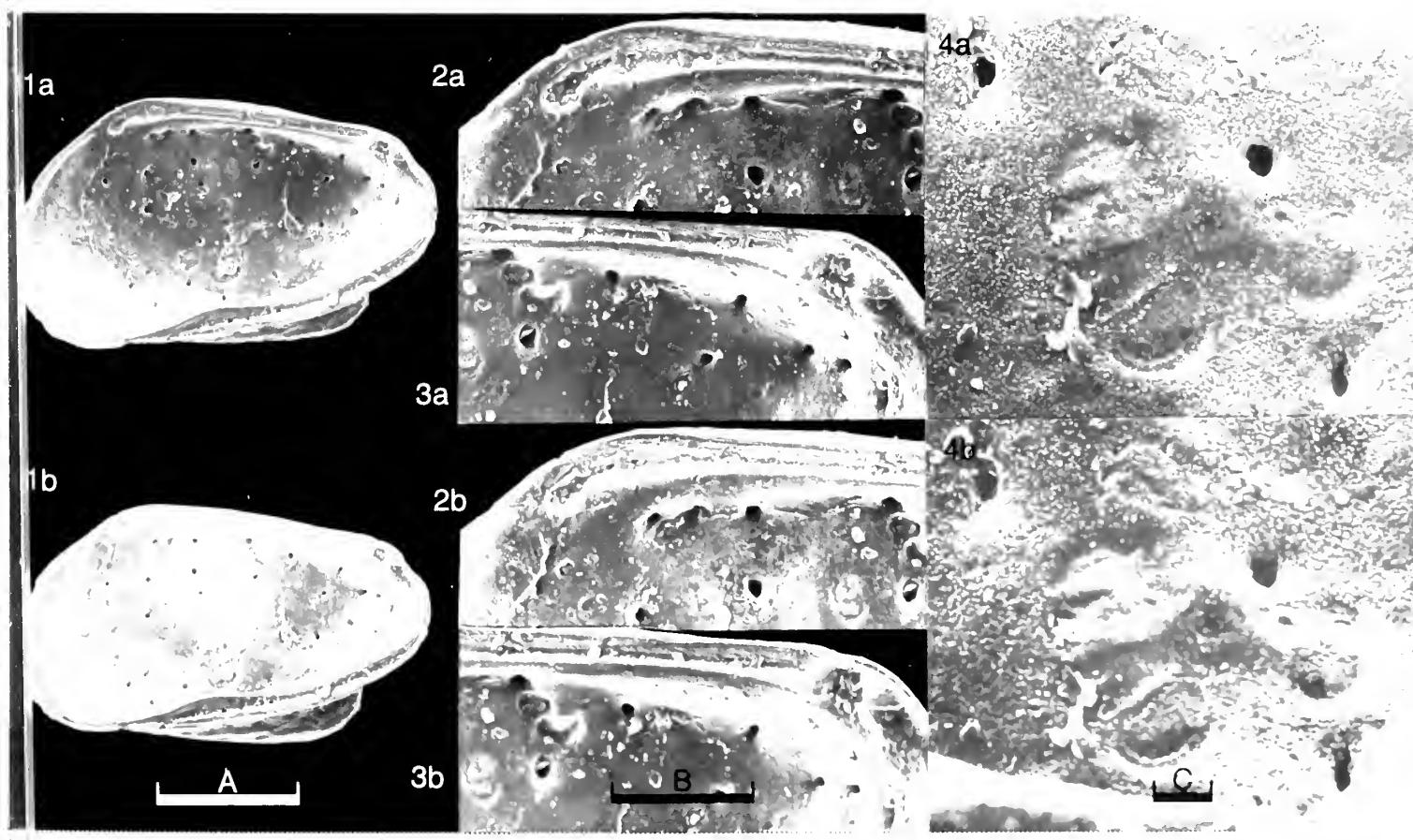
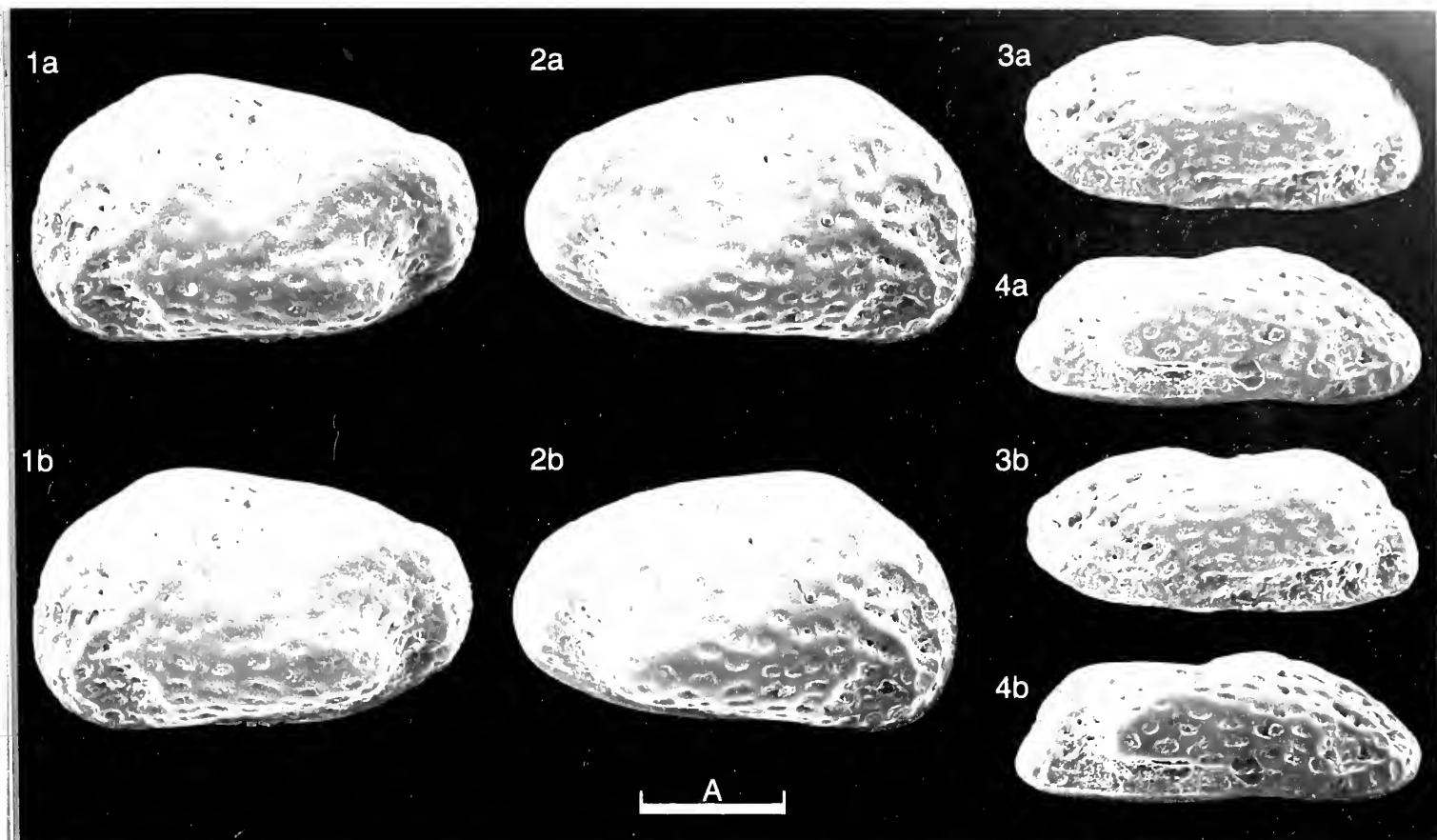
Sexual dimorphism was not observed in *R. minima*, possibly due to the small number of individuals recovered.

Distribution: *R. minima* is confined to the Upper Pliocene deposits of St. Erth (Sample Nos. 1,2,27,28), where it is a rare constituent of the ostracod fauna.

Explanation of Plate 13, 100

Figs. 1-3, RV (paratype OS 12904, 300 μ m long): fig. 1, int. lat.; fig. 2, ant. hinge element; fig. 3, post. hinge element; fig. 4, LV, musc. sc. (holotype, OS 12902, 300 μ m long).

Scale A (100 μ m; \times 200), fig. 1; scale B (40 μ m; \times 500), figs. 2,3; scale C (10 μ m; \times 900), fig. 4.



ON *LEGUMINOCY THEREIS CHITTAGONGENSIS* NEALE & AHMED sp. nov.

by John W. Neale & S. T. Ahmed
(University of Hull, England & University of Rajshahi, Bangladesh)

Leguminocythereis chittagongensis sp. nov.

Holotype: University of Hull coll. no. HU.335.T.17; ♂ RV.

[Paratypes: eight specimens mounted as HU.335.T.15, 16, 18-23].

Type locality: Himchari, in the Inani Anticline, south of Cox's Bazar, Bangladesh; fine, pale-grey sandstone representing a marine intercalation of probable late Miocene age in predominantly non-marine sediments.

Derivation of name: From Chittagong, Bangladesh.

Figured specimens: University of Hull coll. nos. HU.335.T.15 (♀ LV:Pl. 13, 102, fig. 1), HU.335.T.19 (♀ LV:Pl. 13, 102, fig. 2), HU.335.T.17 (holotype, ♂ RV:Pl. 13, 104, fig. 1), HU.335.T.20 (♀ car.: Pl. 13, 104, fig. 2). All from the type locality and horizon.

Diagnosis: An elongate species of *Leguminocythereis* whose prominent longitudinal ribs form a triangular pattern with minor transverse ribs breaking up the inter-costal spaces to give either equidimensional or elongate fossae. There are approximately 40 fine straight or slightly curved marginal pore canals anteriorly and about 25 similar canals in the posterior half of the shell. There are no vestibules and the frontal muscle scar when well seen consists of two contiguous scars.

Explanation of Plate 13, 102

Fig. 1, ♀ LV, int. lat. (HU.335.T.15, 1050 µm long); fig 2, ♀ LV, ext. lat. (HU.335.T.19, 1110 µm long).

Scale A (200 µm; × 92), fig. 1; scale B (200 µm; × 84), fig. 2.

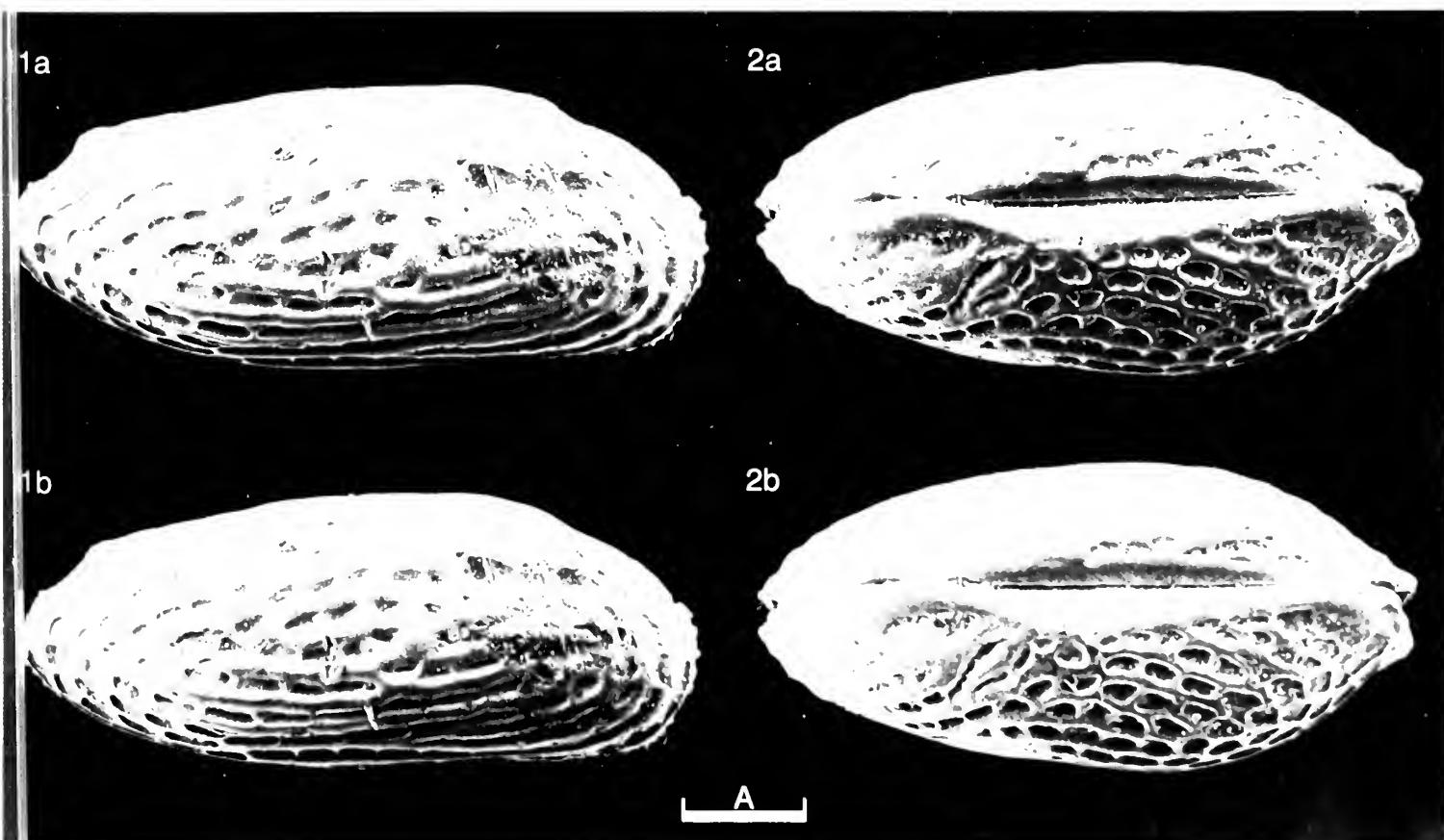
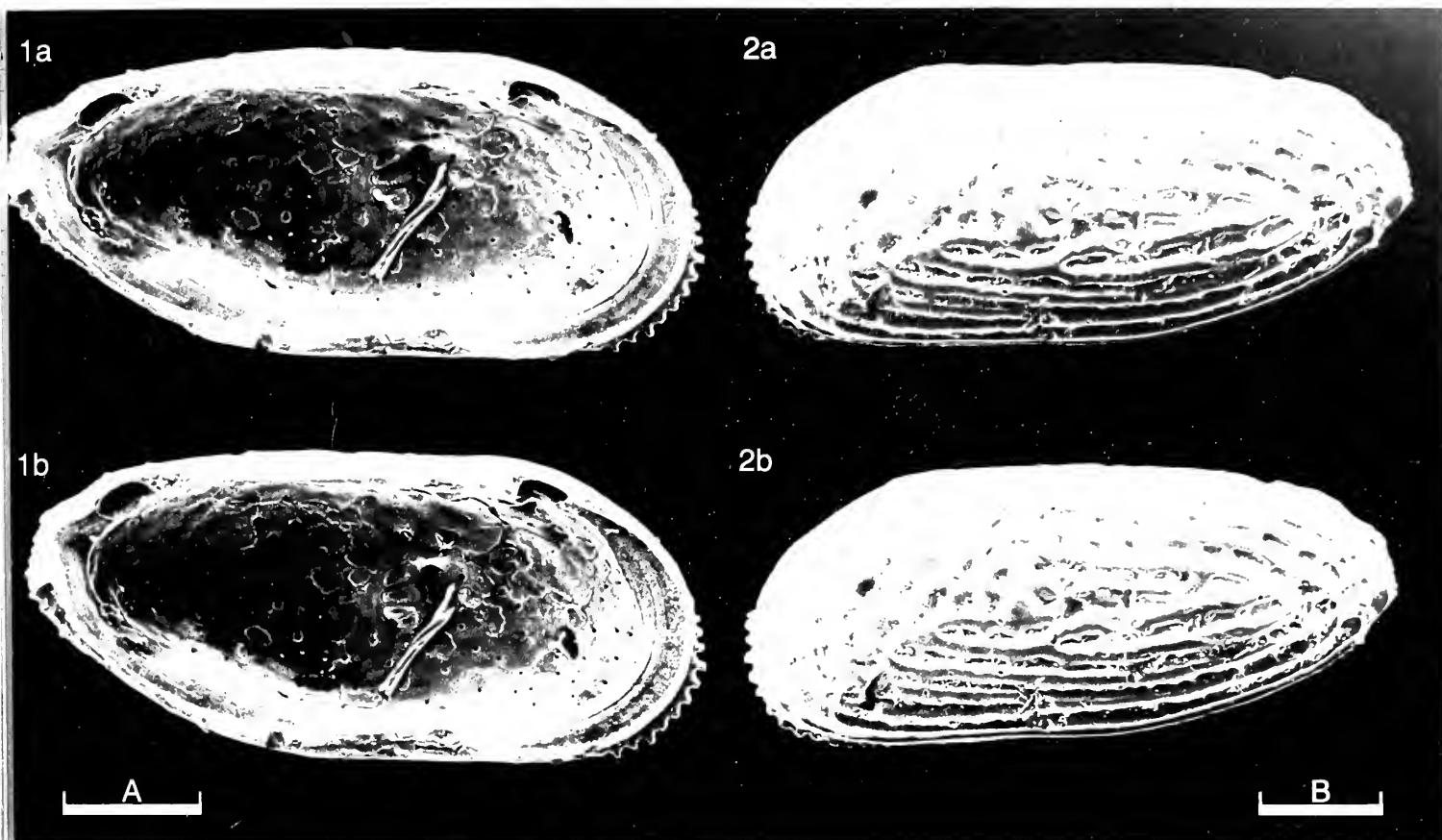
Remarks: This species agrees well with the current interpretation of *Leguminocythereis* Howe, 1936 and differs from *Thalmannia* LeRoy, 1939 in its amphidont hinge structure. From *Asymmetricocythere* Bassiouni, 1971 it differs in lacking the asymmetry produced by a protruding right valve rib and in having finer, more numerous marginal pore canals posteriorly. *L.hassani* Khalifa & Cronin (*Rev. Micropal.*, 22, 1980), from the Eocene of Egypt, is higher in proportion to the length and wider in dorsal view. Closest geographically and stratigraphically is *Thalmannia* cf. *fusa* (van den Bold) of Gramann (1975) from the middle Miocene of Burma. Both Gramann's material and our material differ from Van den Bold's *Thalmannia?* *fusa* from the Miocene of W Africa (*Rev. Inst. Franç. Petrole* 21, 1966) in being wider and having convex extremities in dorsal view. The Bangladesh material is more elongate than the figured Burma specimens. It is not close to other described species.

Distribution: *L.chittagongensis* is found in the Inani Anticline in a grey sandstone which varies between 20 and 30 feet in thickness and which represents a brief marine transgression in a predominantly non-marine sequence. It is associated with a fauna which includes two new species of *Costa* (see *Stereo-Atlas Ostracod Shells*, 13 105-108, 109-112, 1986) and other ostracods indicating a shallow water shelf environment. The contemporaneous foraminiferal fauna (see Ahmed, *Rajshahi Univ. Stud.*, 6, 248-166, 1975) is not completely diagnostic but suggests a late Miocene age, although it is just possible that it may lie on the other side of the boundary in the early Pliocene. Associated *Chlamys*, oysters, barnacles, echinoid spines and the abrasion of thick shelled foraminifers all confirm the suggestion of a shallow open sea environment with appreciable current action and warm, perhaps even tropical, temperature.

Explanation of Plate 13, 104

Fig. 1, ♂ RV, ext. lat. (holotype, HU.335.T.17, 1150 µm long); fig. 2, ♀ car., dors. (HU.335.T.20, 1100 µm long).

Scale A (200 µm; × 84), figs. 1, 2.



ON COSTA HIMCHARIENSIS AHMED sp. nov.

by S. T. Ahmed
(University of Rajshahi, Bangladesh)

Costa himchariensis sp. nov.

- Holotype:* University of Hull, England, coll. no. **HU.335.T.8**; ♀ carapace.
[Paratypes: seven specimens mounted as **HU.335.T.7, 9-14**.]
- Type locality:* Himchari, in the Inani Anticline, south of Cox's Bazar, Bangladesh; fine, pale-grey sandstone representing a marine intercalation of probable late Miocene age in predominantly non-marine sediments.
- Derivation of name:* From Himchari, Bangladesh.
- Figured specimens:* University of Hull, England, coll. nos. **HU.335.T.7** (♀ RV:Pl. 13, 106, fig. 1), **HU.335.T.8** (holotype, ♀ car.: Pl. 13, 106, fig. 2), **HU.335.T.10** (♂ car.: Pl. 13, 108, fig. 2), **HU.335.T.12** (♀ car.: Pl. 13, 108, fig. 1). All from the type locality and horizon.
- Diagnosis:* A species of *Costa* in which the dorsal, median and ventral ribs develop short transverse muri on either side. General reticulation is variable being best seen on the posterodorsal area of the males. There is a short transverse rib from the anterior part of the median rib to the anterior part of the anterior marginal rib.
- Remarks:* This species is placed in *Costa* Neviani (*Mem. Pont. Acc. Sc. Nuovi Lincei, Roma*, **II**, 11, 1928) although it also has strong affinities with *Chrysocythere* Ruggieri (*Palaeont. Ital.*, **56** (N.S.26), 25, 1962) and is, in a sense, intermediate between the two genera. It does, however, lack an eye tubercle which is present in the type-species of both those genera. It differs from *Chrysocythere* in the termination of the median rib which does not join the marginal rib anteriorly and its posterior

Explanation of Plate 13, 106

Fig. 1, ♀ RV, int. lat. (**HU.335.T.7**, 730 µm long); fig. 2, ♀ car., lt. lat. (holotype, **HU.335.T.8**, 750 µm long).
Scale A (100 µm; × 128), fig. 1; scale B (100 µm; × 134), fig. 2.

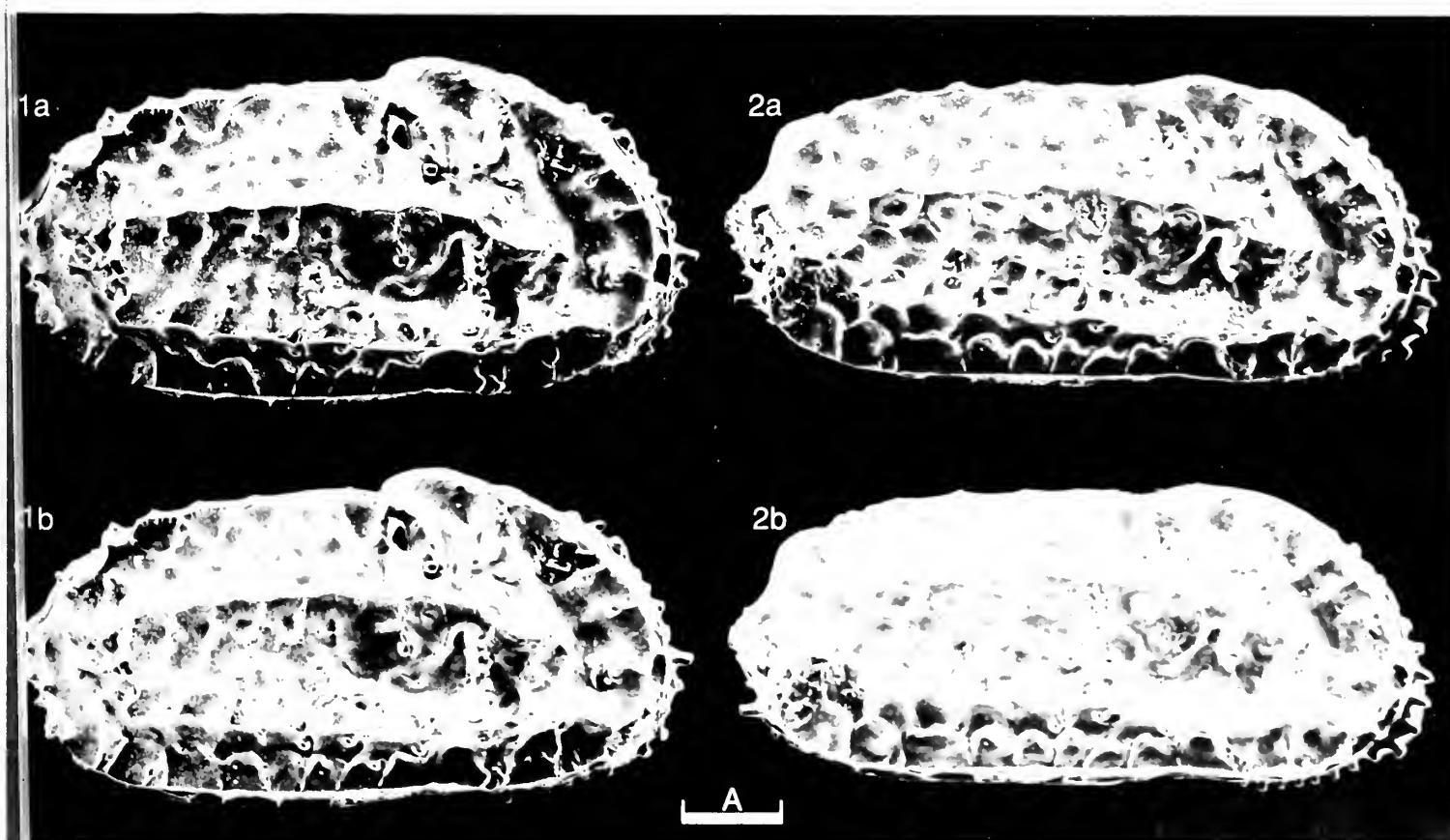
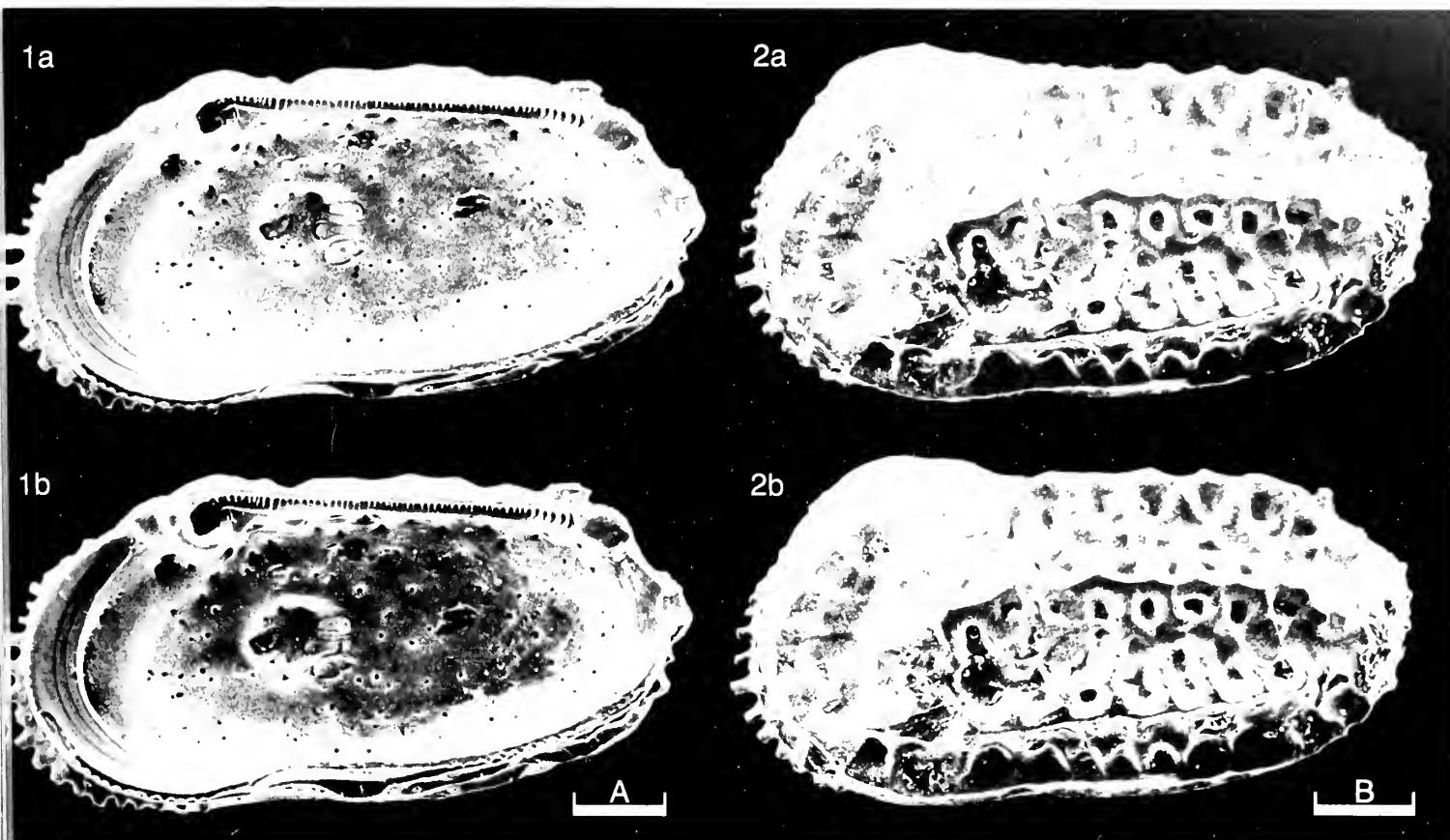
Stereo-Atlas of Ostracod Shells 13, 107

Remarks (contd.): termination turns down before the posterior margin although the downturn is not so pronounced as in *Costa*. Muscle scar pattern and hinge are identical with those in the type-species of the two genera mentioned although Ruggieri's original figure shows the frontal scar as two discrete scars rather than a single hook. It differs from *Costa* in tapering posteriorly rather less than in most species as well as in the characters already mentioned. It differs from *Haughtonileberis* Dingle (*Trans. roy. Soc. S.Afr.*, **38**, 371, 1968) in its marginal spinulation, crenulate median hinge element and lack of vestibules. It lacks the fourth rib of *Paracosta* Siddiqui (*Bull. Br. Mus. Nat. Hist. Geol. suppl.* **9**, 28, 1971) and *Paleocosta* Benson (*Smithson. Contr. Paleobiol.* **35**, 35, 1977). Altogether it agrees reasonably well with the general interpretation of the genus seen in Ruggieri (*Boll. Soc. Pal. Ital.* **1**, 1961) and Ducasse & Mondain-Monval (*Geobios* **17**, 1984). A characteristic feature of the Bangladesh material is the absence of an eye tubercle. This may indicate a discrete east Tethyan development but it is not at present regarded as sufficiently important to separate formally as a named taxon.

C.himchariensis is not close to any species figured in the literature. It shows most resemblance to *Costa tricostata* (Reuss) f. "normale" of Ducasse & Mondain-Monval (*op. cit. pl. 1, figs. 1, 2*) from the Palaeogene of Aquitaine, and *Paleocosta* aff. *mokattamensis* (Bassiouni, 1969) of Donze *et al.* (*Bull. Centres Rech. Explor. Elf-Aquitaine* **6**, pl. 5, figs. 1-5, 1982) from the Thanetian of Tunisia. Both are widely separated in space and time from the present species. *C.himchariensis* is found in the Inani anticline grey sandstone which varies between 20 and 30 feet thick and represents a brief marine transgression in a predominantly non-marine sequence. The associated foraminiferal fauna is not completely diagnostic but suggests a late Miocene age although it is just possible that it may lie on the other side of the boundary in the early Pliocene. Associated *Chlamys*, oysters, barnacles, echinoid spines and abrasion of the thick shelled foraminifera suggest a shallow open sea with appreciable current action and warm or perhaps tropical temperatures.

Explanation of Plate 13, 108

Fig. 1, ♀ car., rt. lat. (**HU.335.T.12**, 750 µm long); fig. 2, ♂ car., rt. lat. (**HU.335.T.10**, 800 µm long).
Scale A (100 µm; × 125), figs. 1, 2.



ON COSTA OBLIQUIFOSSA AHMED sp. nov.

by S. T. Ahmed

(University of Rajshahi, Bangladesh)

Costa obliquifossa sp. nov.

Holotype: University of Hull, England, coll. no. HU.335.T.3; ♂ carapace.

[Paratypes: five specimens mounted as HU.335.T.1, 2, 4-61].

Type locality: Himchari, in the Inani Anticline, south of Cox's Bazar, Bangladesh; fine, pale grey sandstone representing a marine intercalation of probable late Miocene age in predominantly non-marine sediments.

Derivation of name: Latin; in reference to the oblique, ditch-like structure seen in the antero-median area.

Figured specimens: University of Hull, England, coll. nos. HU.335.T.1 (♀ RV : Pl. 13, 110, fig. 1), HU.335.T.2 (♀ car. : Pl. 13, 112, fig. 1), HU.335.T.3 (holotype, ♂ car. : Pl. 13, 110, fig. 2), HU.335.T.4. (♂ car. : Pl. 13, 112, fig. 2). All from the type locality and horizon.

Diagnosis: A species of *Costa* in which an oblique ditch-like depression develops anteromedianly. This starts anteroventrally above the lower rib and runs in a posterodorsal direction to the general region of the adductor muscle scars where it terminates against the median rib.

Explanation of Plate 13, 110

Fig. 1, ♀ RV, int. lat. HU.335.T.1, 795µm long); Fig. 2, ♂ car., rt. lat. (holotype, HU.335.T.3, 860µm long).

Scale A (100 µm; × 121), fig. 1; scale B (100 µm; × 112), fig. 2.

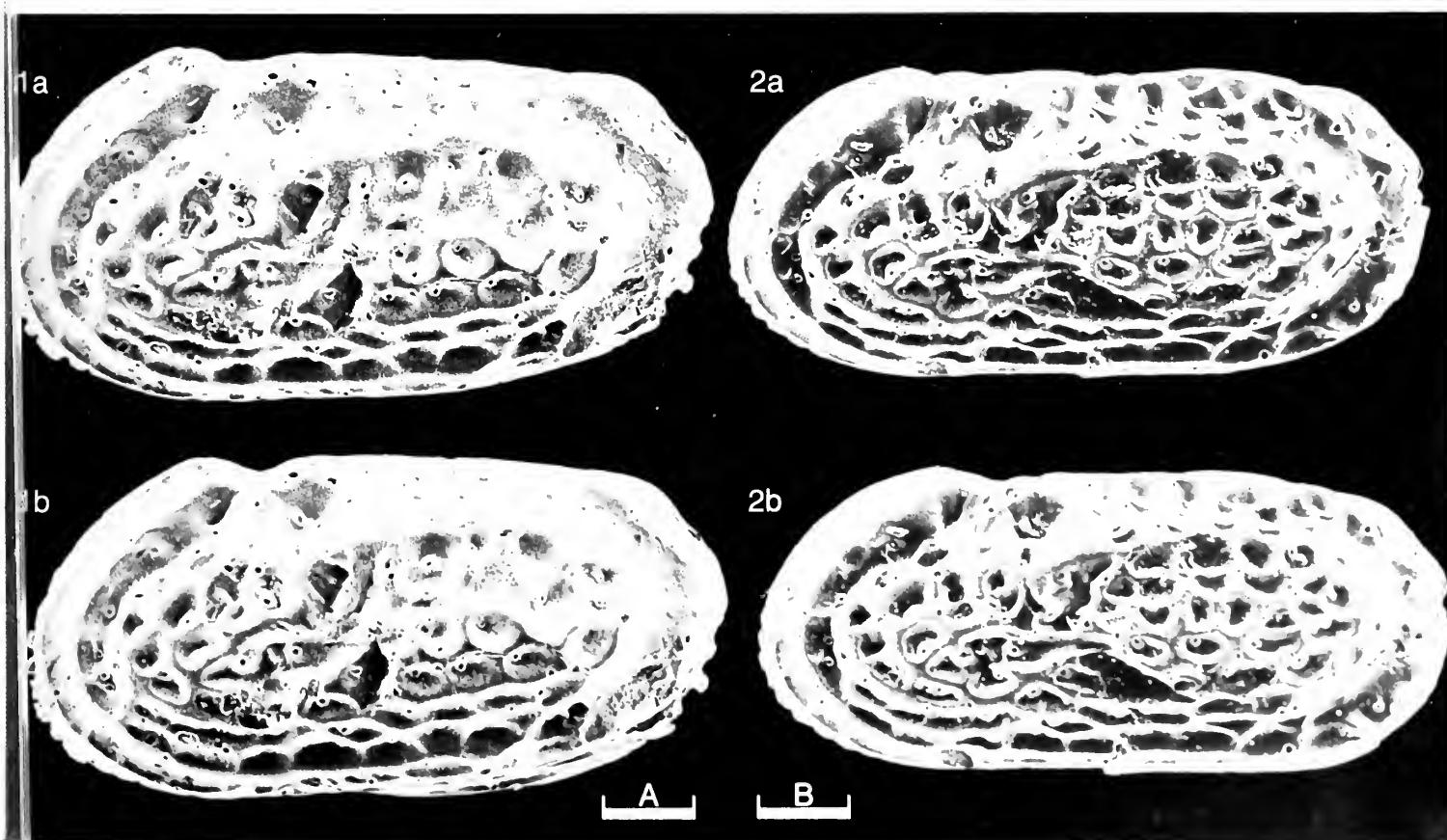
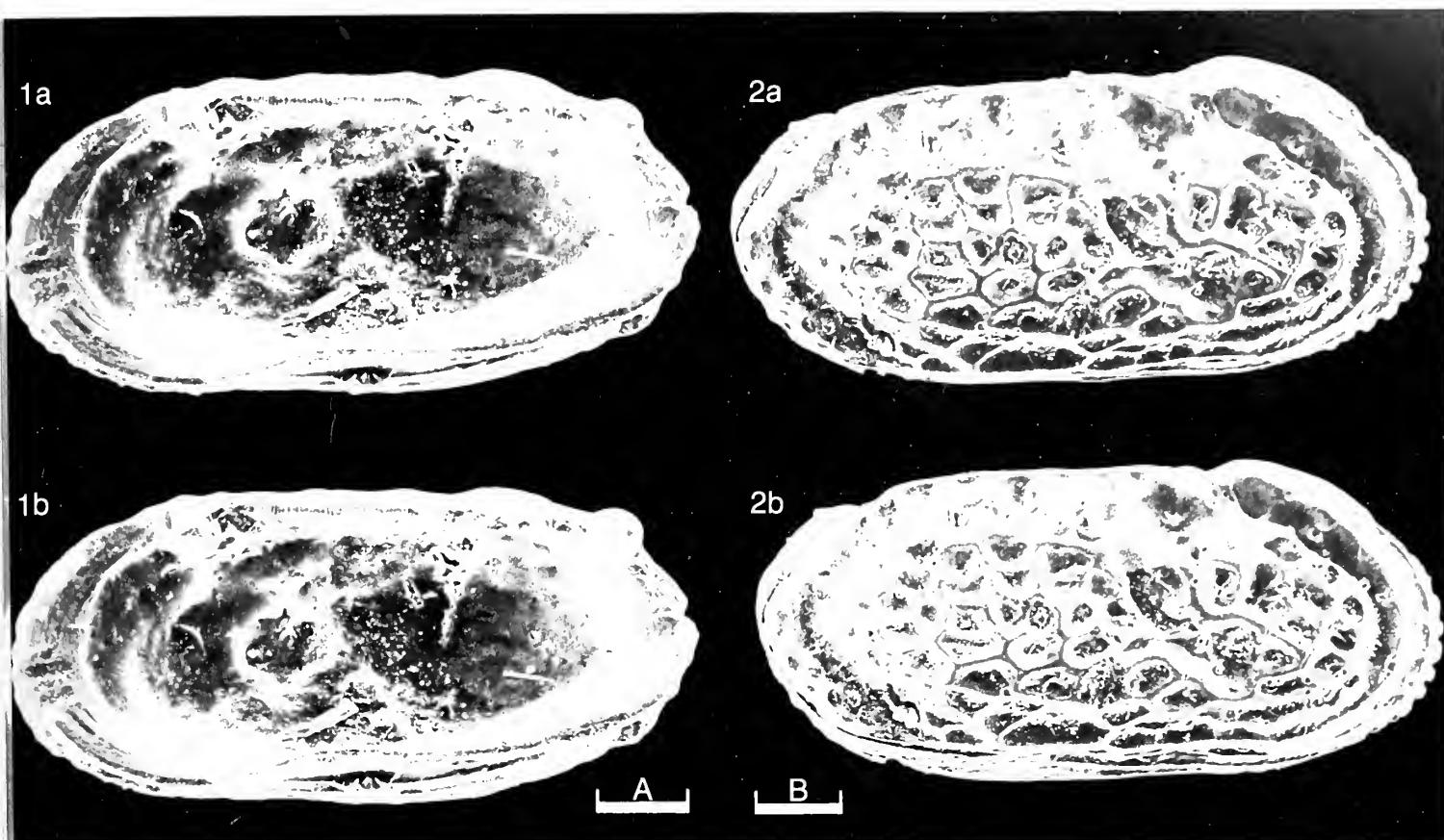
Remarks: This species is assigned to the genus *Costa* Neviani, 1928 for reasons similar to those given in the case of *C.himchariensis* (*Stereo-Atlas Ostracod Shells 13*, 105-108, 1986). It differs clearly from that species in the valve surface being raised instead of depressed between the median and ventral ribs, in the more general reticulation and particularly in the reticulation developed anteriorly. It closely resembles *Costa capsella* Al-Furaih (*Univ. Lib. Univ. Riyadh*, 35, pl. 28, fig. 2, 1980), from the middle Eocene of Saudi Arabia, in many aspects including the fossa, central complex and raised, rather than depressed area, between the median and ventral ribs. The two species differ in details of ornamentation but it seems likely that the Bangladesh species is a later derivative of the Eocene Saudi Arabian one. There is some resemblance to species of *Paleocosta* such as *P. aff. libyaensis* Benson, 1977 of Donze *et. al.* (*Bull. Centres Rech. Explor.-Prod. Elf Aquitaine*, 6, pl. 4, figs. 1-3, 1980), from the middle and upper Palaeocene of Tunisia, but *C. obliquifossa* tapers less posteriorly in lateral view and differs in details of ornamentation. The comparison serves to emphasise, however, the approach to *Paleocosta* in view of the increased ornamentation and incipient development of further longitudinal ribbing. This is best seen between the ventral rib and ventral margin which might suggest reference to *Paracosta*. Nevertheless, the evidence does not seem sufficiently strong to assign them to either genus.

Distribution: The material came from fine grey sandstone which varies between 20 and 30 feet thick and lies near the Miocene/Pliocene boundary in a succession of predominantly non-marine deposits. All the contributory evidence points to a warm, shallow water, marine environment (see *Stereo-Atlas Ostracod Shells 13*, 101-104, 105-108, 1986).

Explanation of Plate 13, 112

Fig. 1, ♀ car., lt. lat. (HU.335.T.2, 820 µm long); fig. 2, ♂ car. lt. lat. (HU.335.T.4, 865 µm long).

Scale A (100 µm; × 120), fig. 1; scale B (100 µm; × 112), fig. 2.



ON NIGEROLOXOCONCHA ONISEGUNI REYMENT

by Richard A. Reyment & Eva R. Reyment

(Department of Historical Geology & Palaeontology, University of Uppsala, Sweden)

Genus *NIGEROLOXOCONCHA* Reyment, 1963

Type-species (by original designation): *Nigeroloxoconcha oniseguni* Reyment, 1963.

Diagnosis: Shaped like *Loxoconcha*, with adont hinge; anterior and posterior-posteroventral vestibules; line of concrescence and inner margin not parallel in posteroventral sector thus forming a broad cusp. In lateral view regularly ovate, ellipsoidal in dorsal aspect. Surface concentrically or irregularly pitted or reticulated in riblet-bound concentrations. Posteroventral surface smooth or lightly pitted. Margins compressed. Site of eye marked by translucency in shell. Sexual dimorphism feebly expressed.

Remarks: Referred by Hartmann (*Bronns Klassen und Ordnungen*, 5, Arthropoda; Abt. 1, Crustacea; 2, Buch 4; 4, Lieferung: Ostracoda, 761, 1975) to the Loxoconchiae Sars, 1925.

Distribution: Late Cretaceous – Paleocene; Nigeria, Ghana, USSR?

Explanation of Plate 13, 114

Fig. 1, car., rt. lat., (PMAf988, 490 µm long); fig. 2, juv.-1 car., rt. lat., (PMAf991A, 480 µm long); fig. 3, damaged car., lt. lat., (PMAf989, 510 µm long).

Scale A (100 µm; × 140), figs 1,3; scale B (100 µm; × 155), fig. 2.

Nigeroloxoconcha oniseguni Reyment, 1963

1963 *Nigeroloxoconcha oniseguni* sp. nov. R. Reyment, *Stockh. Contr. Geol.*, 10, 264, pl. 23, figs. 2,3

Holotype: Geological Department, University of Stockholm, specimen no. GI0 1194, a left valve.

Type locality: Subsurface of western Nigeria, Araromi borehole, approx. lat. 06°35'N. long. 04°55'E, depth 1470 ft; Araromi Shale, Maastrichtian to early Paleocene.

Figured specimens: Palaeontological Museum, University of Uppsala, Sweden, nos. PMAf988 (car.; Pl. 13, 114, fig. 1), PMAf989 (car.; Pl. 13, 114, fig. 3), PMAf990 (RV; Pl. 13, 116, fig. 1), PMAf991 (car.; Pl. 13, 116, fig. 2), PMAf991A (juv.-1 car.; Pl. 13, 114, fig. 2), PMAf992 (car.; Pl. 13, 116, fig. 3).

All from the Araromi Shale, western Nigeria: PMAf988-990 from the Gbekebo borehole (60 km SE of Araromi), all from a depth of 2385 ft; PMAf991-992 from the Araromi borehole: PMAf991 and PMAf991A from a depth of 1450 ft, PMAf992 from 1470 ft.

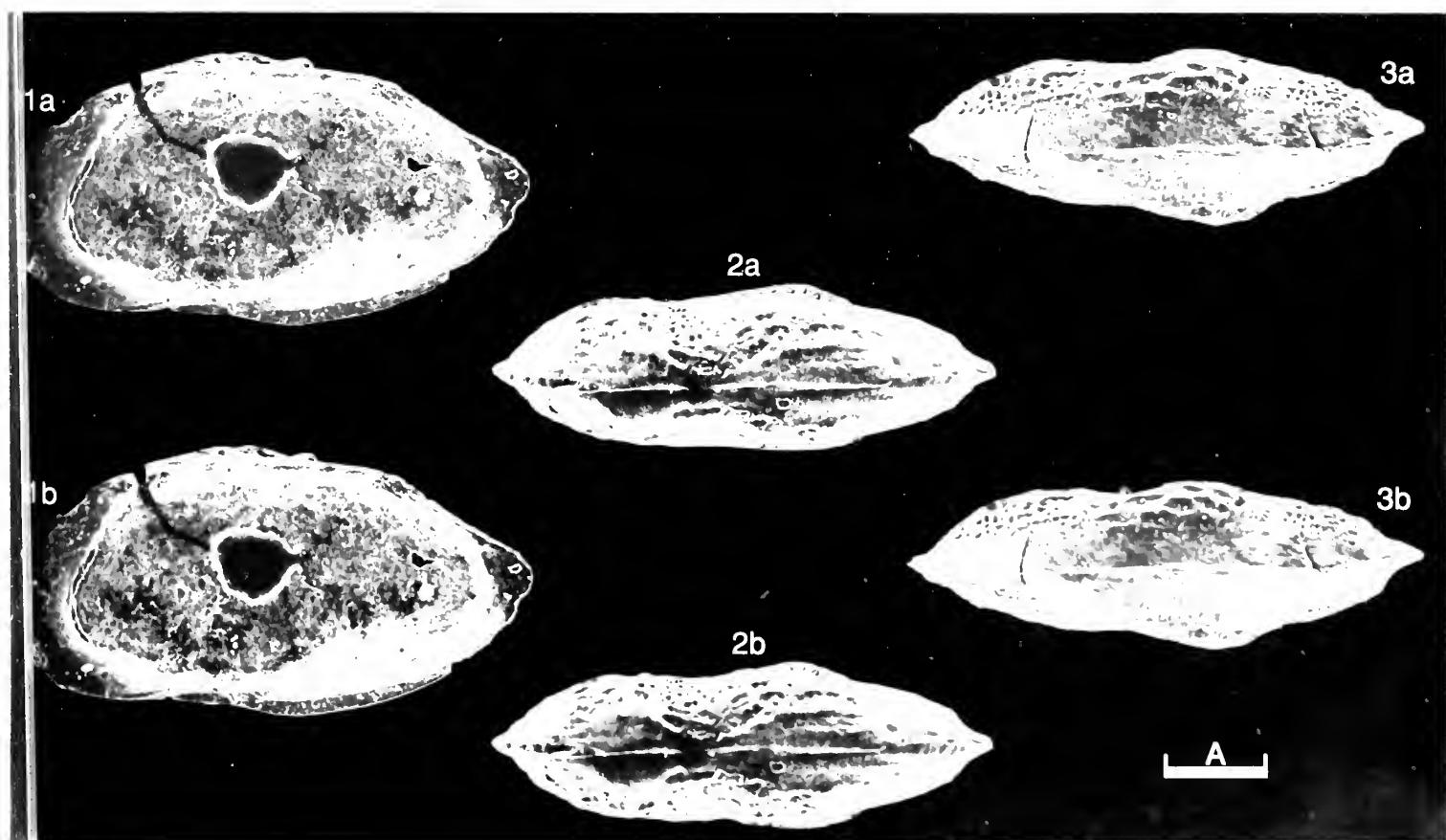
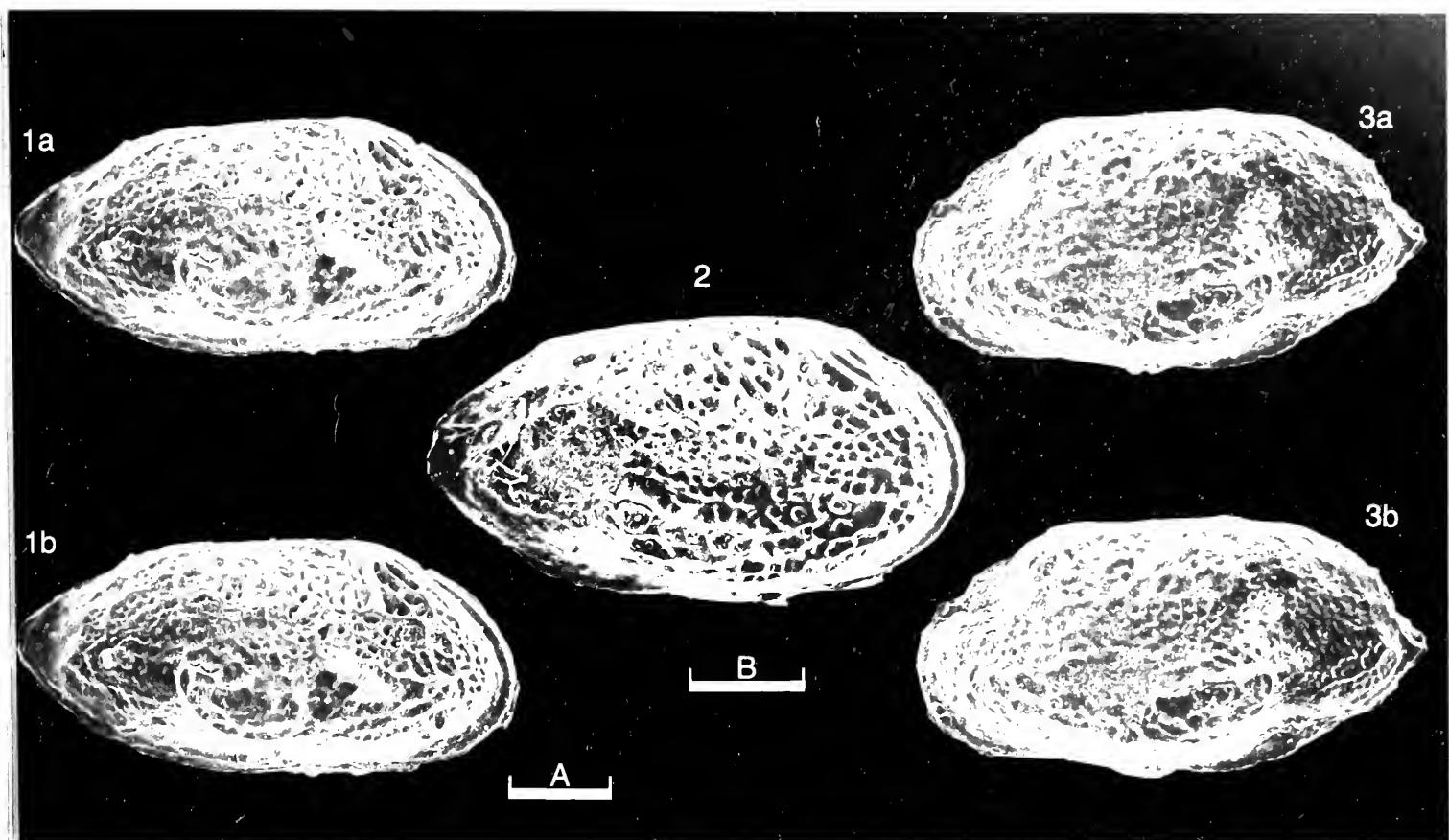
Diagnosis: Ovoid-rectangular in shape, with sub-caudal process. Elongate fusiform in dorsal aspect; margins compressed except along the posterodorsal half of the dorsal margin. The lateral surface bulges irregularly mid-dorsocentrally and mid-centroventrally. Lateral ornament composed of irregular reticulations grouped in tiers. The ventral and posteroventral areas may be smooth or ornamented with a finer reticular mesh. There is a broad, translucent ocular zone. Anterior, posterior and posteroventral vestibules present; inner margin forms a posteroventral cusp. There are about ten straight marginal pore canals.

Distribution: Maastrichtian – early Paleocene of West Africa.

Explanation of Plate 13, 116

Fig. 1, RV, int. lat., showing gastropod drill-hole (PMAf990, 525 µm long); fig. 2, car., dors., (PMAf991, 500 µm long); fig. 3, car., vent., (PMAf992, 510 µm long).

Scale A (100 µm; × 140), figs 1-3.



ON NIGEROLOXOCONCHA OYESESEI REYMENT

by Richard A. Reymont & Eva R. Reymont

(Department of Historical Geology and Palaeontology, University of Uppsala, Sweden)

Nigeroloxoconcha oyesesei Reymont, 1963

1963 *Nigeroloxoconcha oyesesei* sp. nov. R. Reymont, *Stockh. Contr. Geol.*, **10**, 265, pl. 7, figs. 9a-b, pl. 8, fig. 6.

Holotype: Geological Department, University of Stockholm, specimen no. **GIO 1138**; a carapace.

Type locality: Subsurface of western Nigeria, Gbekebo borehole, approx. lat. 06°20'N, long. 05° 30'E, depth 2399 ft; Araromi Shale, Maastrichtian to early Paleocene.

Figured specimens: Palaeontological Museum, University of Uppsala, Sweden, nos. **PMAf993** (car.: Pl. 13, 118, fig. 1), **PMAf994** (LV:Pl. 13, 118, fig. 2), **PMAf995** (car.: Pl. 13, 118, fig. 3), **PMAf996** (LV:Pl. 13, 120, fig. 1), **PMAf997** (car.:Pl. 13, 120, fig. 2), **PMAf998** (RV:Pl. 13, 120, fig. 3).

All from the Araromi Shale, western Nigeria: **PMAf996** is from the Araromi borehole (approx. lat. 06°35'N, long. 04°55'E) at a depth of 1108 ft; the remainder are from the Gbekebo borehole at depths of 2347 ft (**PMAf998**), 2399 ft. (**PMAf994** and **PMAf997**) and 2564 ft. (**PMAf993** and **PMAf995**).

Explanation of Plate 13, 118

Fig. 1, car., lt. lat., (**PMAf993**, 515 µm long); fig. 2, LV, int. lat., detail of posterior showing cusped inner margin (**PMAf994**); fig. 3, car., oblique vent., (**PMAf995**, 500 µm long).

Scale A (100 µm; × 140), figs. 1,3; scale B (100 µm; × 175), fig. 2.

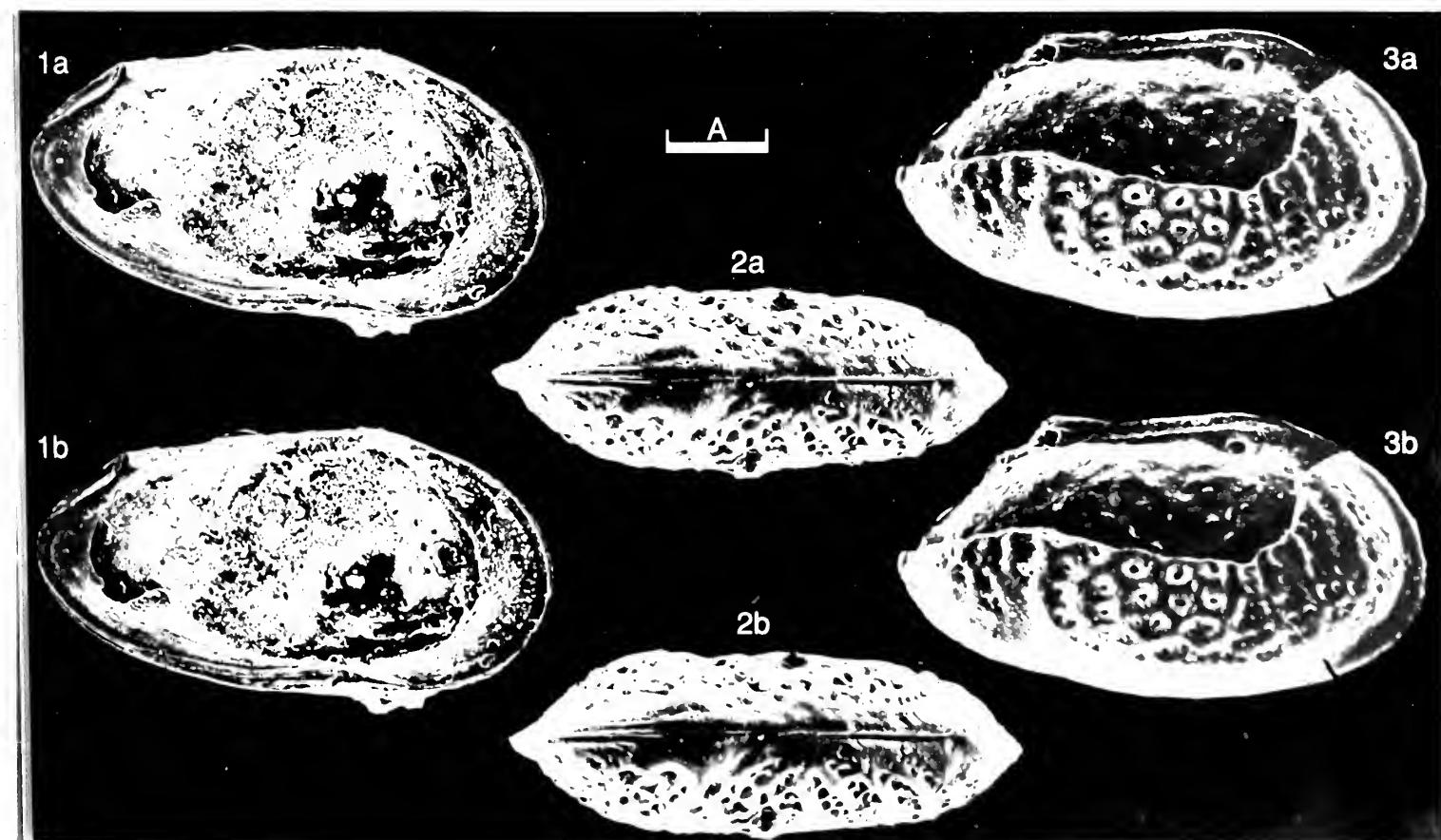
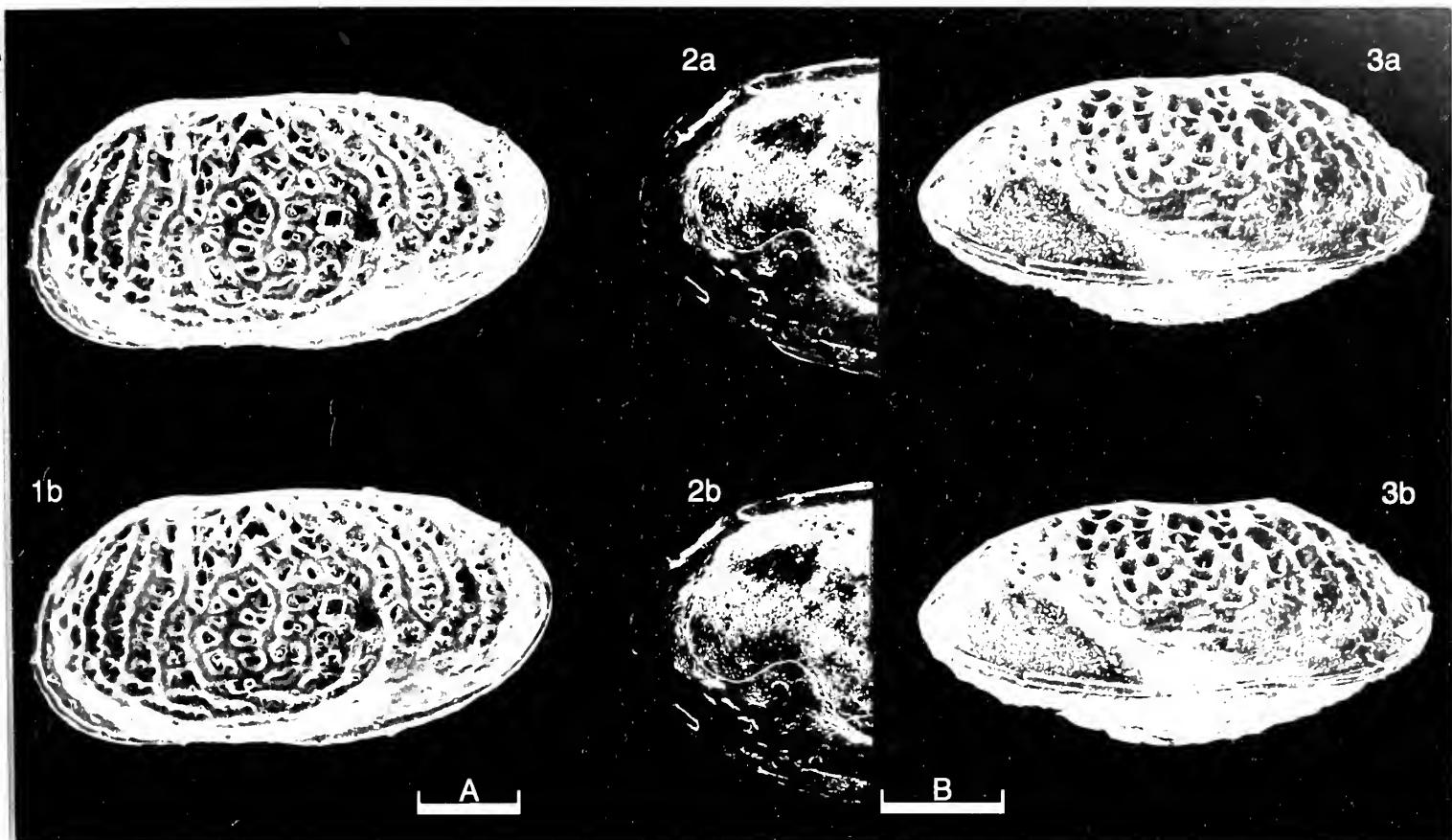
Diagnosis: Ovoid, margins compressed and rimmed, except for posterodorsal stretch. Dorsal margin straight, ventral margin slightly concave. Subhexagonal in dorsal aspect. Inner margin and line of concrescence do not coincide and there are anterior and posterior-posteroventral vestibules; cusped posteroventral incursion of inner margin and line of concrescence. Lateral ornament consists of reticulations or pits grouped within concentric and vertically aligned riblets. Ventral and posteroventral surfaces smooth.

Distribution: Maastrichtian – early Paleocene of western Nigeria.

Explanation of Plate 13, 120

Fig. 1, LV, int. lat., (**PMAf996**, 515 µm long); fig. 2, car., dors., (**PMAf997**, 510 µm long); fig. 3, damaged RV, ext. lat. showing impression of right hinge element in shale (**PMAf998**, 530 µm long).

Scale A (100 µm; × 140), figs 1-3.



ON TOGOINA ATTITOGONENSIS APOSTOLESCU

by R. A. Reyment, E. R. Reyment & S. Majoran
(Department of Historical Geology & Palaeontology,
University of Uppsala, Sweden)

Genus TOGOINA Apostolescu, 1961

Type-species (by original designation): *Togoina attitigonensis* Apostolescu, 1961.

Diagnosis: Subovoidal, strongly inflated, massive carapace with unequally ornamented valves. Anterior margin broadly and eccentrically rounded, posterior subangular to truncated with short caudal process in right valve (only vaguely suggested in left valve). The left valve is larger than the right and overlaps or overhangs the latter around almost the entire margin; the ventral surface of the left valve bears four to five riblets. The anterior and posterior margins may bear a few denticles. The anterior inner margin and line of concrescence do not coincide, thus forming a vestibule; a shallow posterior vestibule may occur. There is usually a broad sulcus beneath the flat, elongated, ovoid eye-tubercle. The eye-socket is broad. Hinge heterodont. The anterior marginal pore canals are simple, straight to sinuous; the posterior pore canals are mostly sinuous, usually simple but occasionally bifurcated or grouped in bundles. The muscle field consists of four vertically aligned adductor scars and a rounded anterior spot. Sexual dimorphism strong, with males longer and with their maximum width nearer mid-length than in females; females inflated posteriorly. Late instars are smooth to feebly pitted in the median area; the final larval stage is ornamented.

Explanation of Plate 13, 122

Fig. 1, ♂ car., rt.lat., mainly smooth morph with median pitting (PMAf114, 885 µm long); fig. 2, juv. -1 car., vent., subreticulate morph (PMAf115, 760 µm long); fig. 3, ♀ car., lt.lat., largely smooth morph (PMAf116, 810 µm long).
Scale A (200 µm; × 80), figs. 1-3.

Remarks: *Togoina* is highly polymorphic with respect to shape and ornament. Shape polymorphism is manifested mainly in the posterior outline. Ornamental polymorphism is developed as smooth, almost smooth, punctate, subreticulate and costate variants. More than one ornamental variant can occur in the same population, hence these are not ecophenotypic; shape polymorphism may, however, be environmentally controlled. *Togoina* resembles *Leguminocythereis* in many respects, but its polymorphic pattern is quite different from what pertains in that genus.

Distribution: Lower Eocene of the Gulf of Guinea (Nigeria, Bénin, Togo, Cameroun?) and Argentina.

Togoina attitigonensis Apostolescu, 1961

- 1961 *Togoina attitigonensis* n.g. n.sp., V. Apostolescu, *Revue Inst. fr. Pétrole*, **16**, 811, pl. 9, figs. 163-166, pl. 18, figs. 320-322.
1961 *Togoina obesa* sp. nov., V. Apostolescu, *ibid.*, 812, pl. 9, figs. 167-171.
1963 *Togoina attitigonensis* Apostolescu; R. Reyment, *Stockh. Contr. Geol.*, **10**, 97, pl. 2, fig. 2, pl. 10, figs. 4-7, text-figs. 80-7, 8.
1963 *Togoina obesa* Apostolescu; R. Reyment, *ibid.*, 99, pl. 8, figs. 1a-b, pl. 21, figs. 3-11, pl. 22, fig. 1, text-figs. 80-9, 10.

Holotype: Institut français du Pétrole, Paris, no. **H154**; a carapace.

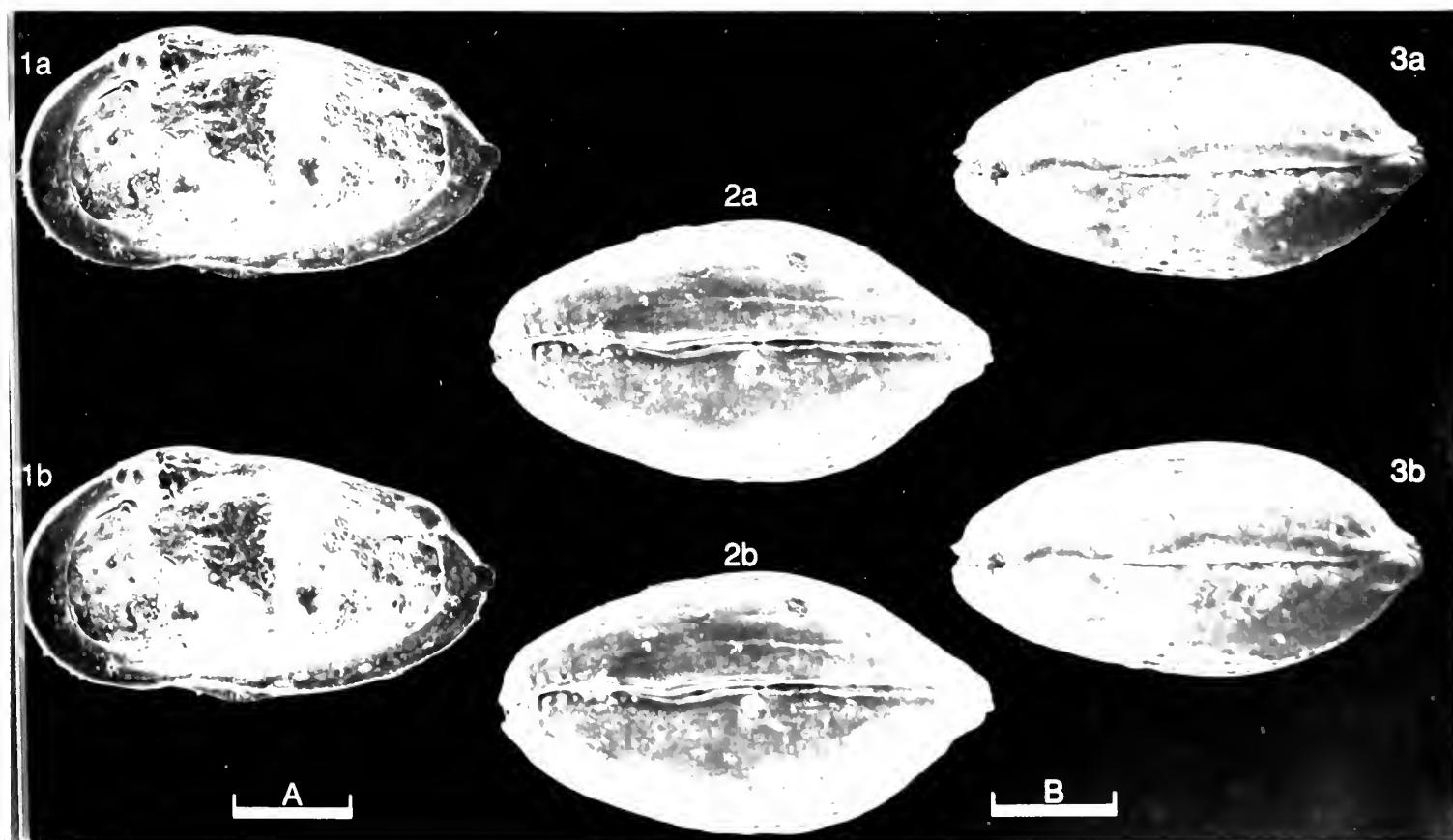
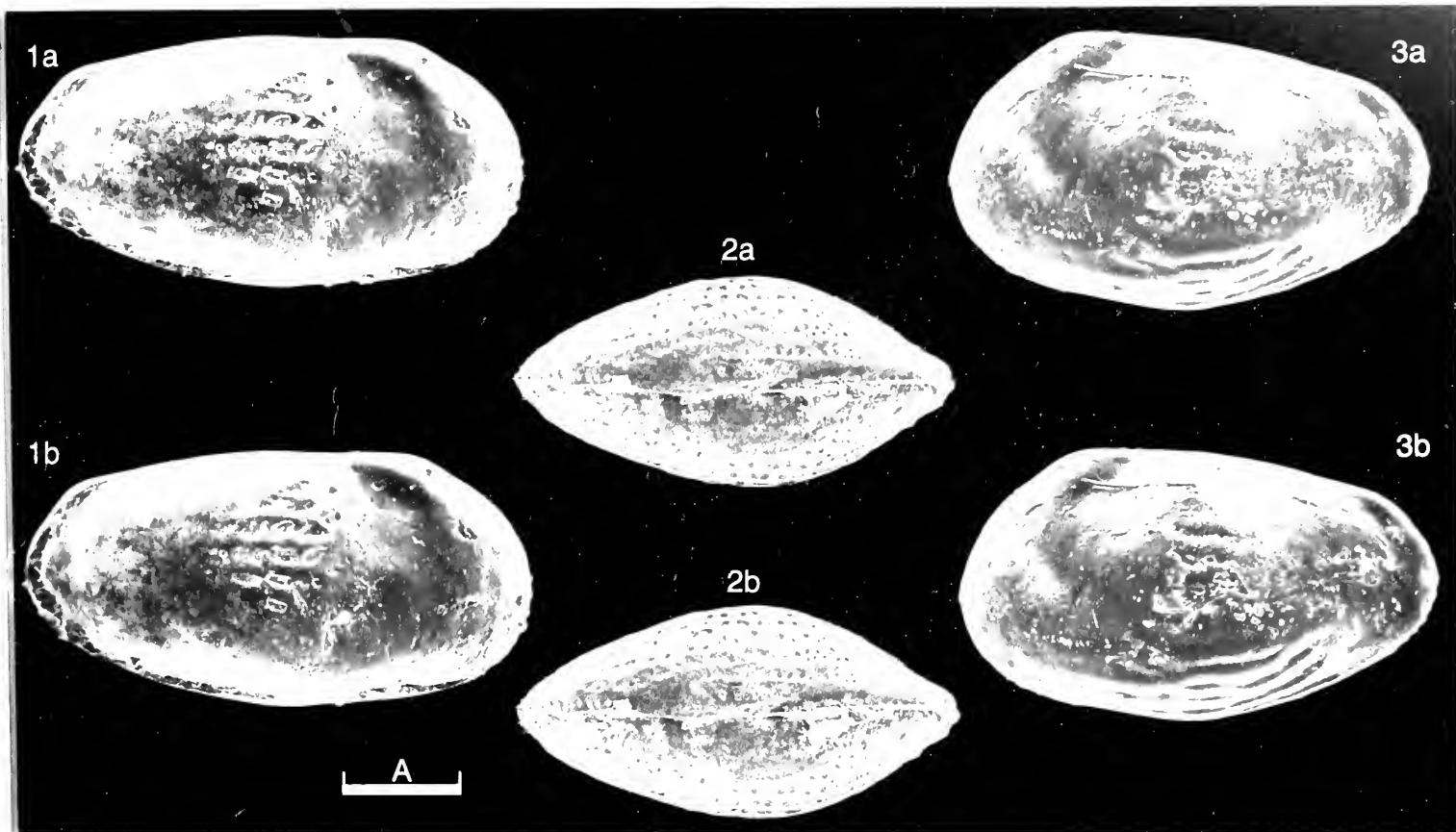
Type locality: Subsurface of the Republic of Togo, Gulf of Guinea, West Africa, borehole at Attitgon, approx. lat. 06° 12'N, long. 01° 36'E, at a depth of 131 m; Eocene.

- Figured specimens:** Palaeontological Museum, University of Uppsala, Sweden, nos. PMAf114 (♂ car.: Pl. 13, 122, fig. 1), PMAf115 (juv. -1 car.: Pl. 13, 122, fig. 2), PMAf116 (♀ car.: Pl. 13, 122, fig. 3), PMAf177 (♀ RV:Pl. 13, 124, fig. 1), PMAf118 (♀ car.: Pl. 13, 124, fig. 2), PMAf119 (♀ car.: Pl. 13, 124, fig. 3), PMAf120 (♀ car.: Pl. 13, 126, fig. 1), PMAf121 (♀ LV:Pl. 13, 126 fig. 2), PMAf122 (♀ car.: Pl. 13, 126, fig. 3), PMAf123 (♀ RV:Pl. 13, 128, fig. 1), PMAf124 (juv. -1 car.: PL. 13, 128, fig. 2), PMAf125 (♂ car.: Pl. 13, 128, fig. 3).

All from the Ameki Formation, Lower Eocene, of Nigeria. PMAf114-119 are from 105-108m depth in the Iju borehole; PMAf123 and 125 are from 37-43m depth in the Iju borehole; PMAf115, 121, 122 and 124 are from 146-150m depth in the Otta borehole. The Otta and Iju boreholes were drilled by the Public Works Department, Lagos, Nigeria in 1935 and 1936.

Explanation of Plate 13, 124

- Fig. 1, ♀? RV, int. lat., showing hinge (PMAf117, 810 µm long); fig. 2, ♀ car., vent., pitted morph (PMAf118, 720 µm long); fig. 3, ♀ car., dors., pitted morph (PMAf119, 820 µm long). Scale A (200 µm; × 80), figs. 1, 3; scale B (200 µm; × 95), fig. 2.



Diagnosis: Highly polymorphic in ornamentation (reticulate, smooth (retention of larval characteristics) or punctate) and shape of posterior. Anterior and posterior denticulation variable. Hinge heterodont with vaguely lobate posterior tooth and variable bifid anterior tooth in right valve. Larval stages smooth or displaying phantom ornamentation.

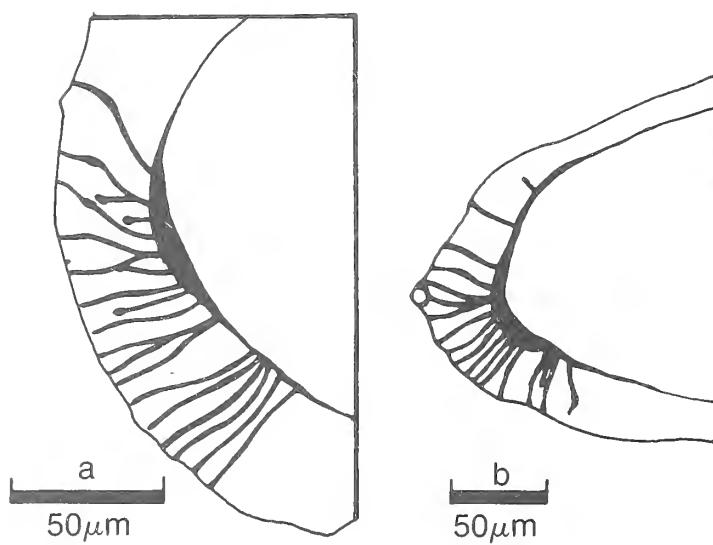
Remarks: This form was originally erected as two species, albeit doubtfully, by Apostolescu (1961, *op.cit.*), a separation that can no longer be maintained in the light of what is known of polymorphism in some groups of ostracods. The pattern of morphs displayed by *Togoina* matches what is found in related genera.

Distribution: Lower Eocene of the Gulf of Guinea (Togo, Bénin, Nigeria).

Explanation of Plate 13, 126

Fig. 1, ♂ car., rt.lat., pitted morph (PMAf120, 860 µm long); fig. 2, ♀ LV, int.lat., detail of hinge (PMAf121, 660 µm long); fig. 3, ♀? car., rt.lat., subreticulate morph (PMAf122, 890 µm long).

Scale A (200 µm; × 80), figs. 1, 3; scale B (200 µm; × 120), fig. 2.

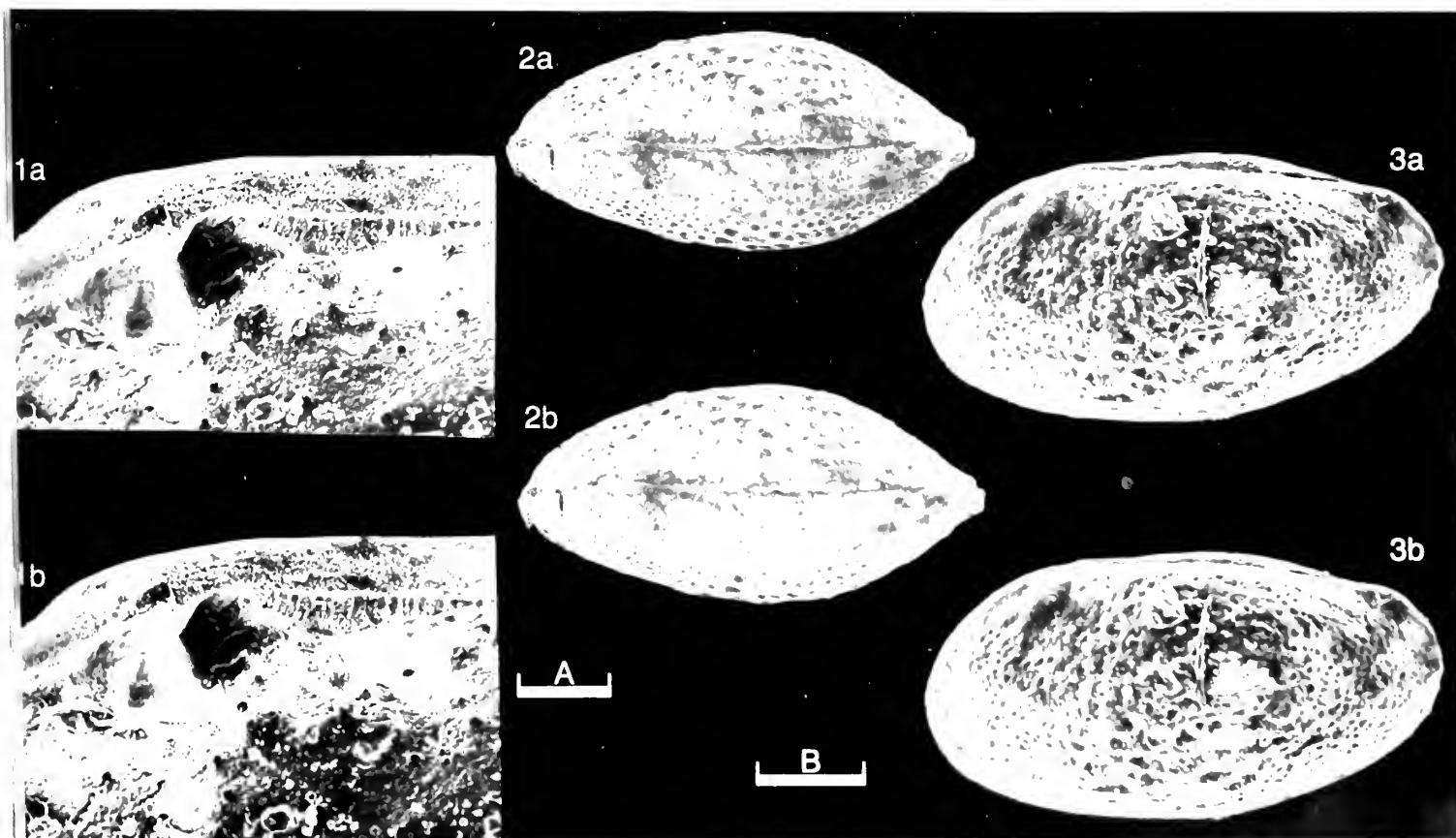
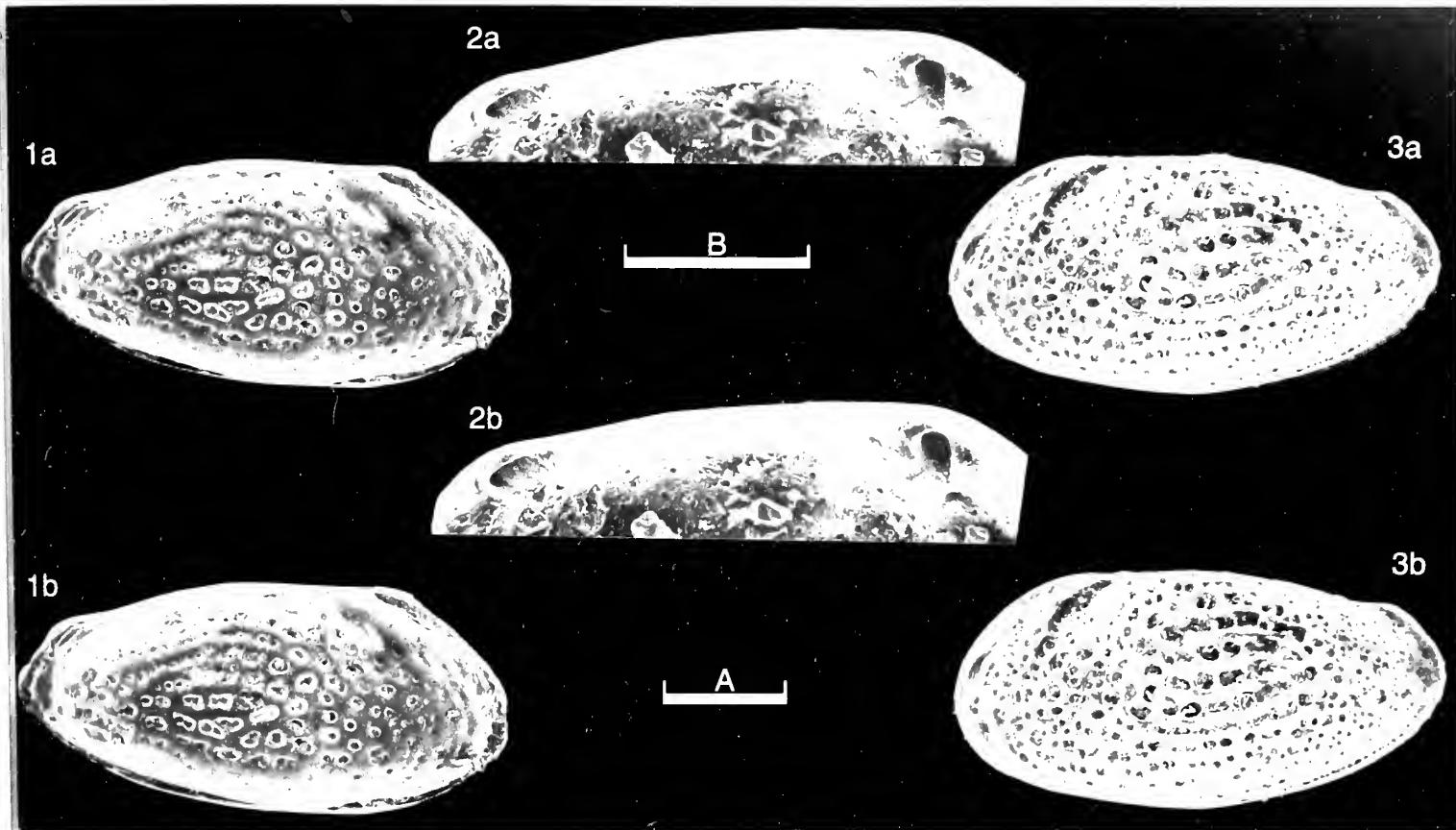


Text-fig. 1. *Togoina attitogonensis*. a, anterior marginal pore canals of RV; b, posterior marginal pore canals. Drawings made from photographs in transmitted light.

Explanation of Plate 13, 128

Fig. 1, ♀ RV, int.lat., detail of anterior hinge element (PMAf123); fig. 2, juv. -1 car., dors., subreticulate morph (PMAf124, 820 µm long); fig. 3, ♂ car., lt.lat., finely punctate morph (PMAf125, 950 µm long).

Scale A (50 µm; × 250), fig. 1; scale B (200 µm; × 75), figs. 2, 3.



ON IBEROCYPRIS CORNUTUS BABINOT

by J. F. Babinot
(Université de Provence, Centre Saint-Charles-Marseille, France)

Genus *IBEROCYPRIS* Babinot, 1985
Type-species (by original designation): *Iberocypris cornutus* Babinot, 1985.

Diagnosis: Carapace trapezoid-shaped in lateral view; left valve strongly overlapping the right, particularly by a supradorsal structure: a median denticulate rim with horn-like protrusions at the anterior and posterior ends; prominent ventral ridge. Right valve smaller and narrower, lacking dorsal protrusions. Ornamentation: mostly smooth but partly reticulate and/or ribbed in the medioventral area of the valves. Hinge adont. Central muscle scars: 5 subcircular scars, as in the Candonidae. Marginal pore canals straight, very narrow, about 20 at the anterior margin.

Remarks: This genus shows several distinctive features such as the crenulate-rimmed supradorsal margin of the left valve with distal horns and a strong valve dimorphism. However, in some respects it is similar to some freshwater inequivaled genera such as *Limnocypridea* Ljubimova, 1956, *Cyprideamorphella* Mandelstam, 1956, *Turkmenella* Schneider, 1963, *Ilyocyprimorpha* Mandelstam, 1956 . . . all of which are from the Cretaceous of the U.S.S.R.

Explanation of Plate 13, 130

Fig. 1, ♂ LV, int. lat. (holotype, HBR 2, 800 µm long); fig. 2, LV int. lat., dorsal part (PBR 2/6, length unknown); fig. 3, ♂ LV, ext. lat. (PBR 2/10, 850 µm long); fig. 4, LV int. lat., central muscle scars (PBR 2/1).
Scale A (200 µm; × 64), figs. 1-3; scale B (200 µm; × 396), fig. 4.

Iberocypris cornutus Babinot, 1985

1985 *Iberocypris cornutus* n.gen., n.sp., J.F. Babinot, *Rev. Micropal.*, 27,4, pl.1, figs. 1-8, pl.2, figs. 1-9.

Holotype: Coll. of Université de Provence, Centre Saint-Charles, Laboratoire de Stratigraphie et de Paléoécologie, no. HBR2; ♂ LV.

Type locality: South Fontfria, 10 kms NW of Segura de Los Banos, Teruel, Spain; approx. lat. 40°55'N, long. 1°10'W. Maastrichtian, Cretaceous. In reddish sands and lutites with charophytes.

Figured specimens: Université de Provence, Centre Saint-Charles, nos. HBR 2 (holotype, ♂ LV: Pl. 13, 130, fig. 1), PBR 2/6 (LV: Pl. 13, 130, fig. 2), PBR 2/10 (♂ LV: Pl. 13, 130, fig. 3), PBR 2/1 (LV: Pl. 13, 130, fig. 4), PBR 2/14 (♂ LV: Pl. 13, 132, fig. 1), PBR 2/19 (♂ car. Pl. 13, 132, fig. 2), PBR 2/7 (♀ RV: Pl. 13, 132, fig. 3), PBR 2/8 (♀ car.: Pl. 13, 132, fig. 4).

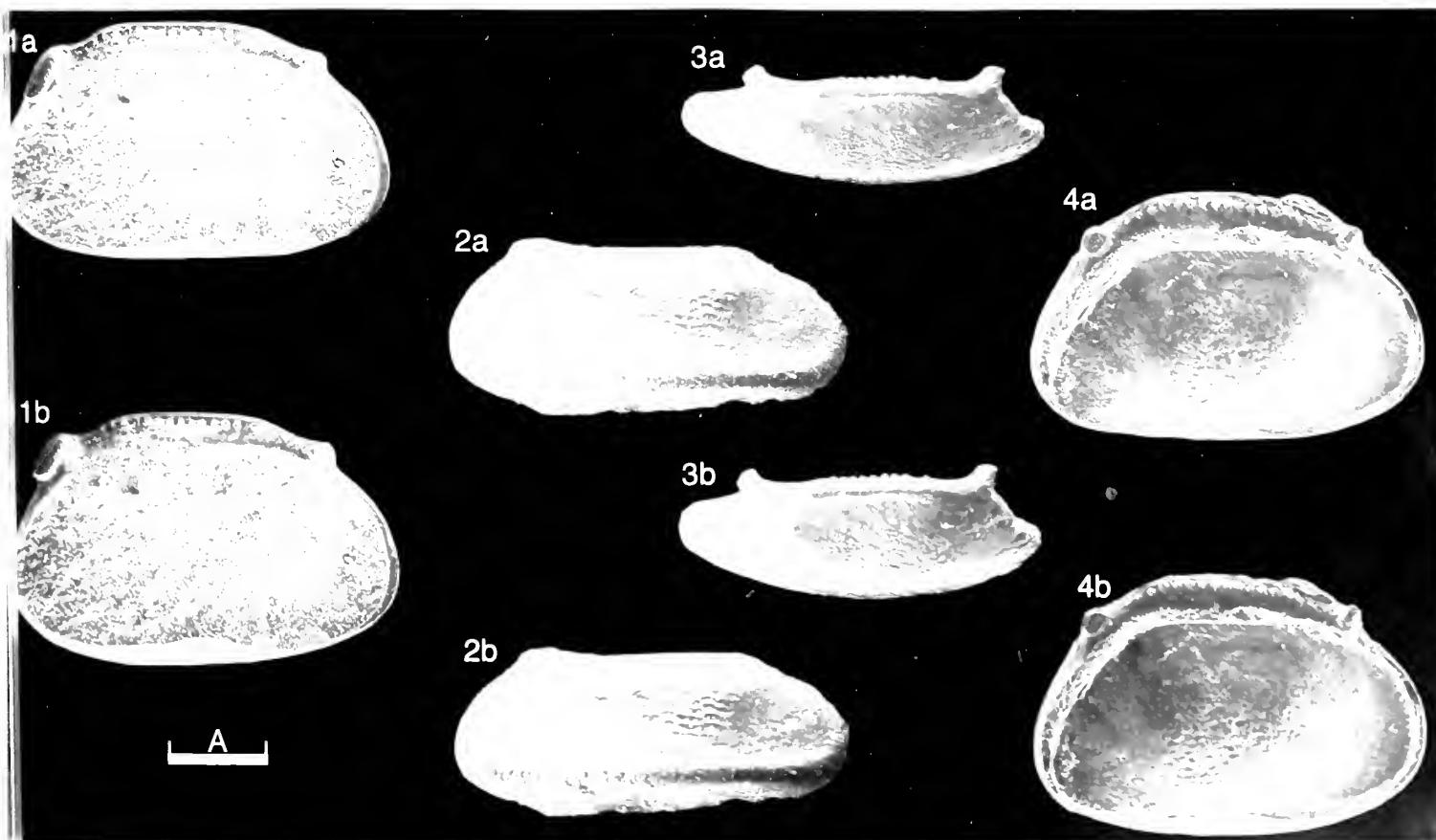
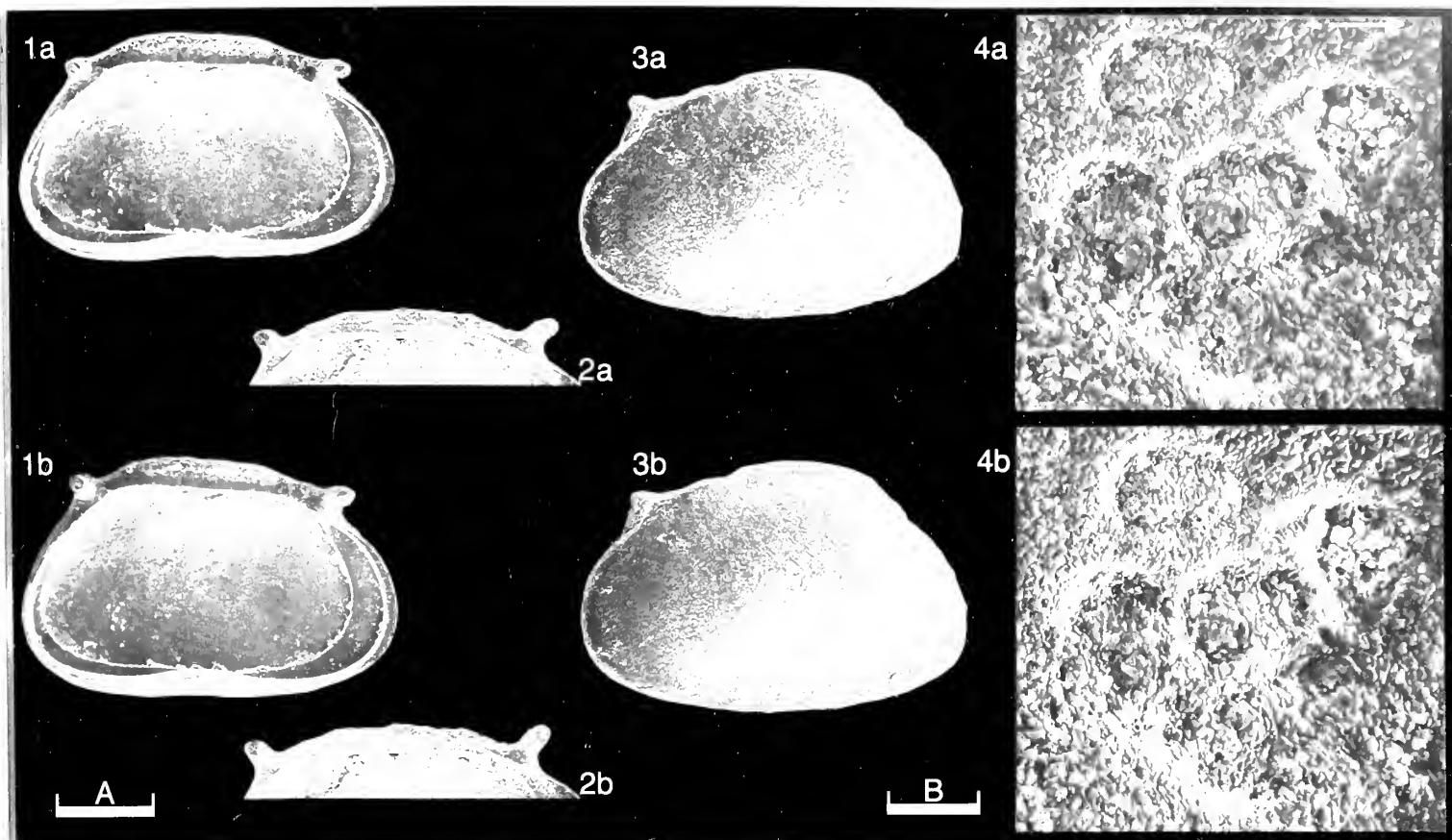
All of the specimens were collected by Dr. E. Moissenet (Université Paris I) and all come from Fontfria, Teruel, Spain.

Diagnosis: As for the genus. *Iberocypris* is currently monotypic.

Distribution: Only known from freshwater deposits in the Maastrichtian of east-central Spain.

Explanation of Plate 13, 132

Fig. 1, ♂ LV, int. lat. (PBR 2/14, 880 µm long); fig. 2, ♂ car. ext. obl. vent. (PBR 2/19, 870 µm long); fig. 3, ♀ RV dors. (PBR 2/7, 820 µm long); fig. 4, ♀ car., ext. lt. lat. (PBR 2/8, 830 µm long).
Scale A (200 µm; × 64), figs. 1-4.



ON PARAPOKONYELLA TAXYAE (BABINOT)

by J. F. Babinot

(Université de Provence, Centre Saint-Charles-Marseille, France)

Genus *PARAPOKONYELLA* Babinot, 1980

Type-species (by original designation): *Opimocythere taxyaе* Babinot, 1970.

Diagnosis: Carapace strongly swollen with prominent lateroventral area underlined by a medioventral rib. Left valve overlapping right, particularly at cardinal angles, with margin extending anteriorly in a frontal hinge ear. Ornament: reticulate or partly reticulate, especially medially. In ventral view, carapace arrow-shaped, with sinuous ribbing (elevated muri of the reticulum). Hinge amphidont. Marginal zones large, without vestibula; marginal pore canals sinuous, not abundant.

Remarks: This genus probably belongs to the Hemicytherinae. *Parapokornyella* differs from *Pokornyella* Oertli, 1956 by the following: carapace more rectangular in lateral view, dorsal margin nearly straight or slightly convex; posterior end larger with pronounced cardinal ear on the left valve only; hinge teeth more or less denticulate. The Tertiary genus *Aurila* Pokorny, 1955 does not have the dimorphism of *Parapokornyella*; the shape is tapered (rather than arrow-shaped) in dorsal and ventral views; the same general trends appear in the subgenera of *Aurila* erected by G. Ruggieri (*Boll. Soc. Pal. Ital.*, **14**, 1, 27-46, 1975). *Opimocythere* Hazel, 1968 differs by its ventral shape, brachycytherid type of hinge, its numerous marginal pore canals and, moreover, by a circular pit which cuts the selvage at the posterior end. *Parapokornyella* is a possible ancestor of the Cenozoic genus *Pokornyella* (occurring more abundantly in marine Paleogene deposits); the *Aurila* group (Neogene) may also be phylogenetically linked to these genera. *Parapokornyella* contains: *P. taxyaе* (Babinot, 1970) (Cenomanian); *P. triangulata* Babinot, 1980 (uppermost Turonian-Santonian); and *P. decorata* Babinot, 1980 (Santonian).

Explanation of Plate 13, 134

Fig. 1, car. ext. lat. (PCE 3/5, 720 µm long); fig. 2, car. vent. (PCE 3/10, 690 µm long); fig. 3, car. ext. lat. (PCE 3/11, 660 µm long);
fig. 4, car. dors. (PCE 3/12, 630 µm long).

Scale A (200 µm; × 87), figs. 1-4.

Parapokornyella taxyaе (Babinot, 1970)

- 1970 *Opimocythere taxyaе* n.sp., J.F. Babinot, *Rev. Micropal.*, **13**, 2, 98-99, pl.1, figs. 9-11, pl.2, figs. 12-13.
1973 *Opimocythere taxyaе* Babinot; J.P. Colin, *Thèse Univ. Paris VI*, 167, pl.16, figs. 4a-b.
1978 *Opimocythere taxyaе* Babinot; B. Andreu, *Thèse Univ. Toulouse*, 258, pl.33, figs. 11-12.
1978 *Opimocythere taxyaе* Babinot; J.F. Babinot, J.P. Colin, R. Damotte, & P. Donze, *Géologie Méditerranéenne*, **5**, 1, 22.
1980 *P. taxyaе* (Babinot); J.F. Babinot, *Trav. Lab. Géol. hist. Pal. Univ. Provence*, **10**, 207-209, pl.41, figs. 1-7, pl.42, figs. 1-3.
1985 *Parapokornyella taxyaе* (Babinot); J.F. Babinot, J.P. Colin, & R. Damotte, in: H.J. Oertli (Ed.), *Ostracodes de France*, *Bull. Centres Rech. Explor.-Prod. Elf-Aquitaine, Mém.*, **9**, 218, pl.67, figs. 8-11.

Holotype: Univ. de Provence, Marseille, Lab. de Strat. et de Paléoécologie, no. HCE 3; carapace.

Type locality: La Bégude, 3 kms SW of Le Camp-du-Castellet, Var, France; approx. lat. 47° 55'N., long. 3° 45'E. Late Cenomanian, Cretaceous. In marly limestones with oysters and benthic foraminifera.

Figured specimens: Univ. de Provence, paratypes PCE 3/5 (car.: Pl. 13, 134, fig. 1), PCE 3/10 :car.: Pl. 13, 134, fig. 2), PCE 3/11 (car.: Pl. 13, 134, fig. 3), PCE 3/12 (car.: Pl. 13, 134, fig. 4), PCE 3/13 (RV:Pl. 13, 136, figs. 1,3), PCE 3/14 (RV:Pl. 13, 136, fig. 2), PCE 3/15 (car.: Pl. 13, 136, fig. 4).

All from the type-locality.

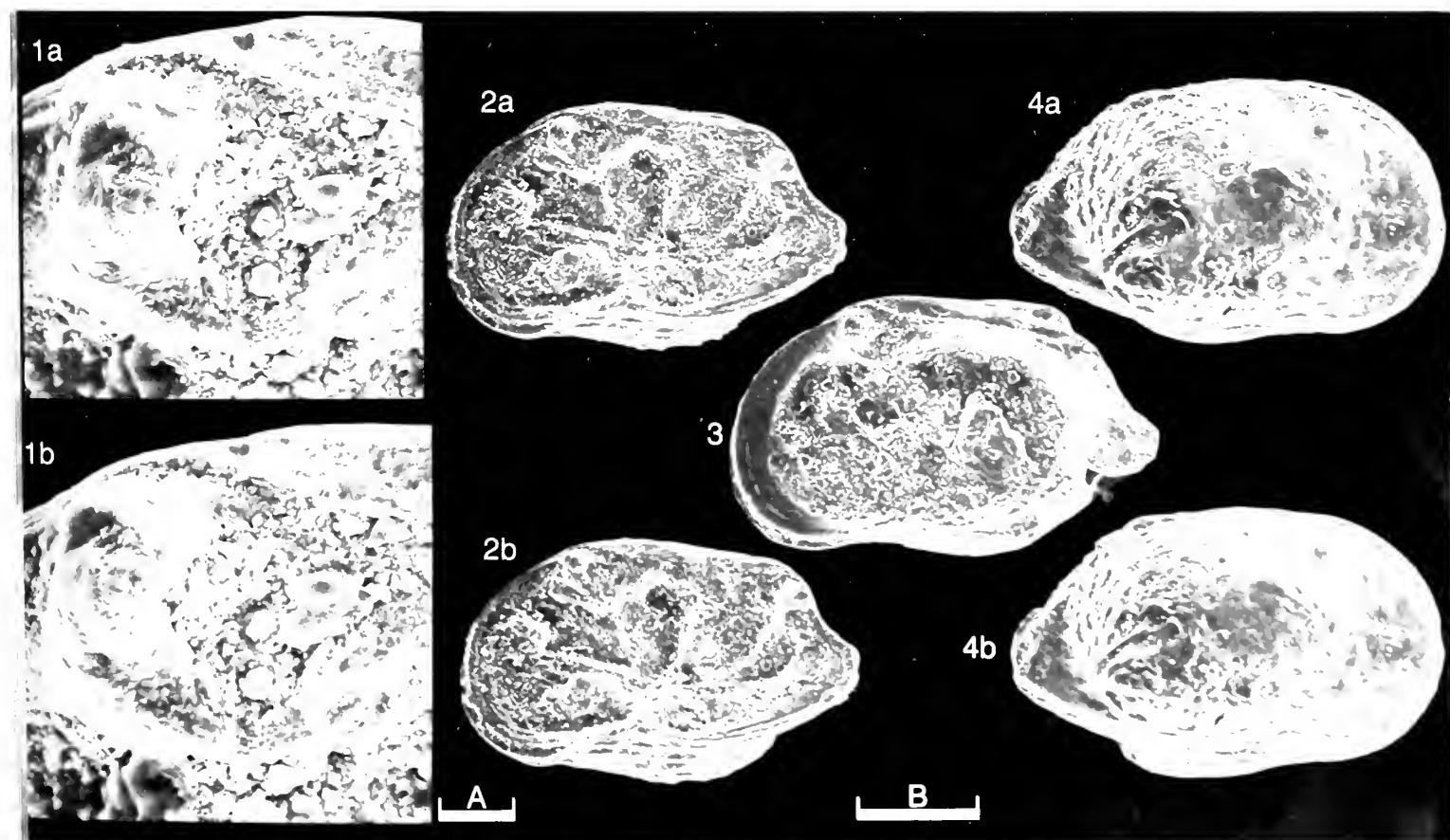
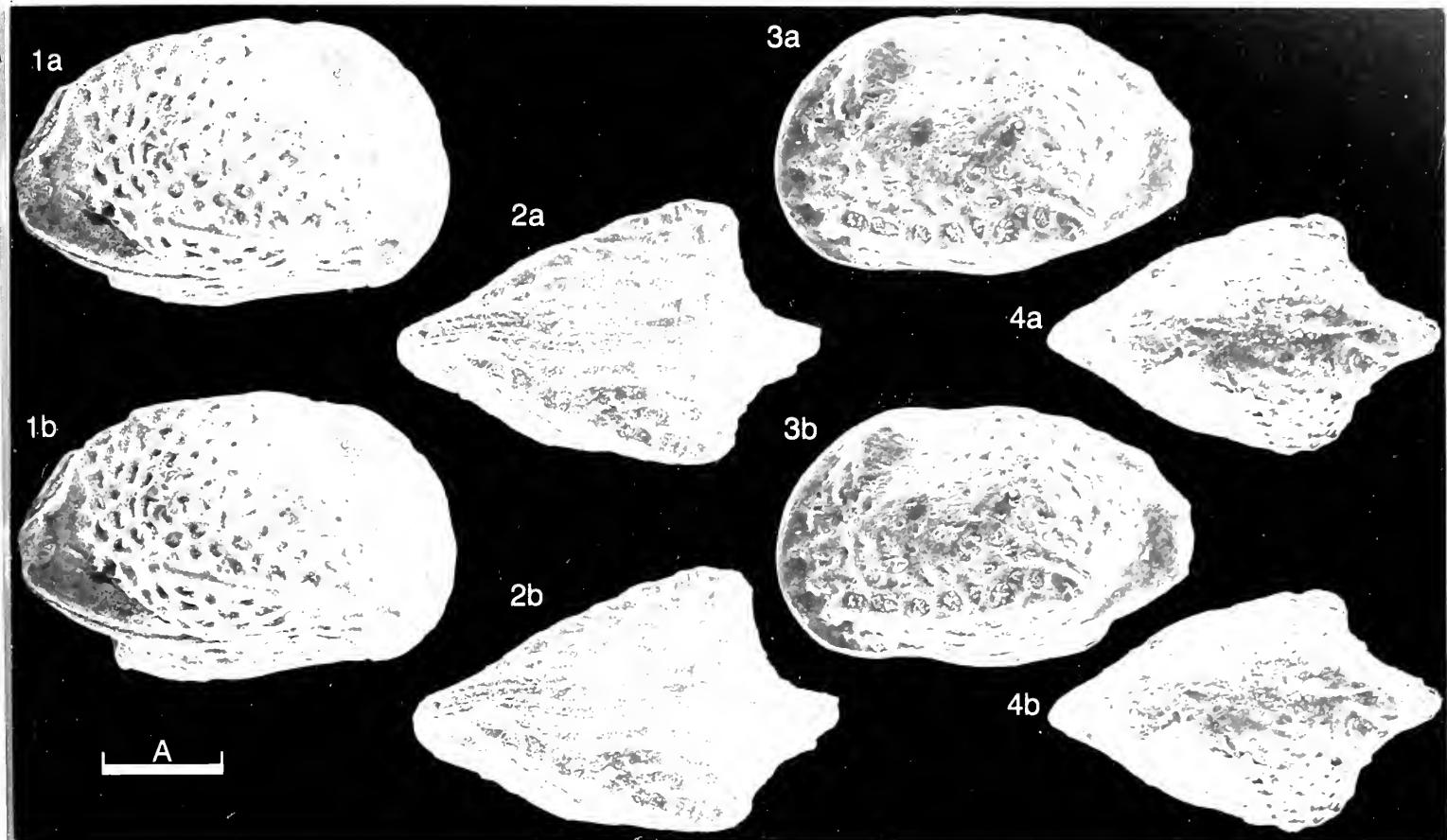
Diagnosis: *Parapokornyella* with strong median reticulation with thick tegmen, ventral ridge with 2 carinae posteriorly; eye tubercle low, on a transverse frontal lobe adjacent to a posterior depression; anterior margin depressed with 5-6 low muri; posterior end strongly depressed, smooth or slightly pitted; dorsal rim and subcentral tubercle scarce or absent. Muri appear as more sinuous riblets on ventral area. Hinge slightly paramphidont. Right valve with anterior tooth well developed, more or less incised; more elongate posterior tooth fanning out upwards; subdivided into 2-4 elements; anterior adjacent socket large, rounded.

Distribution: Only known in shallow water deposits. In Provence, SE France, especially in the internal part of carbonate platforms: more accurately, in the internal-median part of inner sheltered platforms, as shown by J.F. Babinot & J.P. Colin (in: R.F. Maddocks (Ed.), *Applications of Ostracoda*, 195, fig. 6, 1983, Univ. Houston, Texas).

Known from Provence, S France (middle to late Cenomanian); Dordogne, Charentes and Landes in the Aquitaine Basin (middle to late Cenomanian); and from the late Cenomanian of Sierra de Montsech, Aragon, Spain.

Explanation of Plate 13, 136

Fig. 1, RV, int. lat., ant. tooth (PCE 3/13); fig. 2, RV int. lat. (PCE 3/14, 640 µm long); fig. 3, RV int. lat. (PCE 3/13, 690 µm long);
fig. 4, car. ext. lat. (PCE 3/15, 710 µm long). Scale A (120 µm; × 490), fig. 1; scale B (200 µm; × 87), figs. 2-4.



ON PARACANDONA OCCITANICA BABINOT & TAMBARÉAU sp. nov.

by J. F. Babinot & Y. Tambareau

(Université de Provence, Centre Saint-Charles-Marseille & Université Paul Sabatier, Toulouse, France)

Paracandona occitanica sp. nov.

- 1980 *Paracandona* sp.1; J.F. Babinot, *Trav. Lab. Géol. hist. Pal. Univ. Provence*, 10, pl.50, figs 5-7.
1983 *Paracandona* sp.1; J.F. Babinot, M. Bilotte, Y. Tambareau & J. Villatte, *Géologie méditerranéenne*, 10, 3-4, 273, pl.1, figs. 4,5.
1985 *Paracandona* sp.1; J. F. Babinot, J.P. Colin & R. Damotte, in: H.J. Oertli (Ed.), *Ostracodes de France, Bull. Centres Rech. Explor.-Prod. Elf-Aquitaine, Mém.* 9, 255, pl.70, figs. 6,7

Holotype: Université de Provence, Centre Saint-Charles, Marseille, Laboratoire de Stratigraphie et de Paléoécologie, no. **HBR3**; carapace (coll. Y. Tambareau).

Type locality: North Peyrecave, roadside 800m before Cassé, Haute-Garonne, France; lat. 43°12' 50"N, long. 0°55'17"E. "Marnes d'Auzas" Formation; in brackish/freshwater paleoenvironments (see below). Upper Maastrichtian, Cretaceous.

Deviation of name: From Occitania; mediaeval name of 'Langue d'oc' speaking region.

Figured specimens: Université de Provence, Centre Saint-Charles, Marseille, nos. **HBR3** (holotype, carapace: Pl. 13, 138, figs. 1-3), **BRPy1** (LV:Pl. 13, 140, figs. 1,2), **PBR3/1** (paratype, LV:Pl. 13, 140, fig. 3) **PBR3/2** (paratype, car.: Pl. 13, 142, figs. 1-3), **PBR3/3** (paratype, LV:Pl. 13, 142, fig. 4), **BR3Pr1** (car.: Pl. 13, 144, fig. 1), **BR3Pr2** (car.: Pl. 13, 144, fig. 2), **BR3Py2** (RV:Pl. 13, 144, fig. 3)

The holotype and paratypes are from Peyrecave, the type locality. Specimens **PBRPy1-2** are from Auzas, Haute-Garonne; **BRPr1** is from Les Baux, Alpilles, Bouches-du-Rhône, France; **BRPr2** is from Velaux, 3 km N of Rognac, Bouches-du-Rhône. Localities at Peyrecave and Auzas are upper Maastrichtian; Les Baux and Velaux are in the lower Maastrichtian (Begudian).

Explanation of Plate 13, 138

Figs. 1-3, car. (holotype, **HBR3**, 1163 µm long): fig. 1, vent.; fig. 2, vent. details; fig. 3, vent. ornament.

Scale A (200 µm; × 49), fig. 1; scale B (100 µm; × 87), fig. 2; scale C (50 µm; × 261), fig. 3.

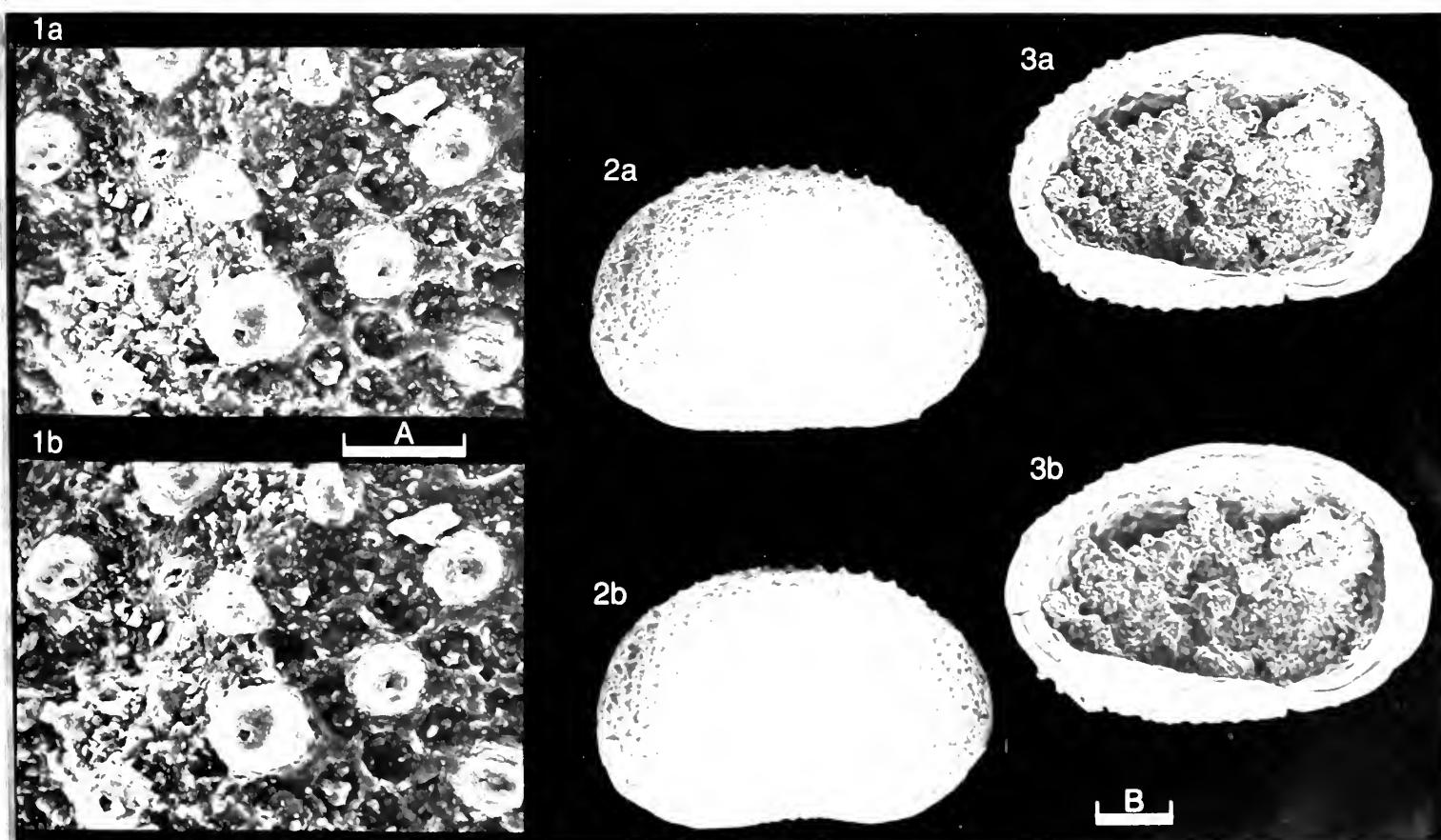
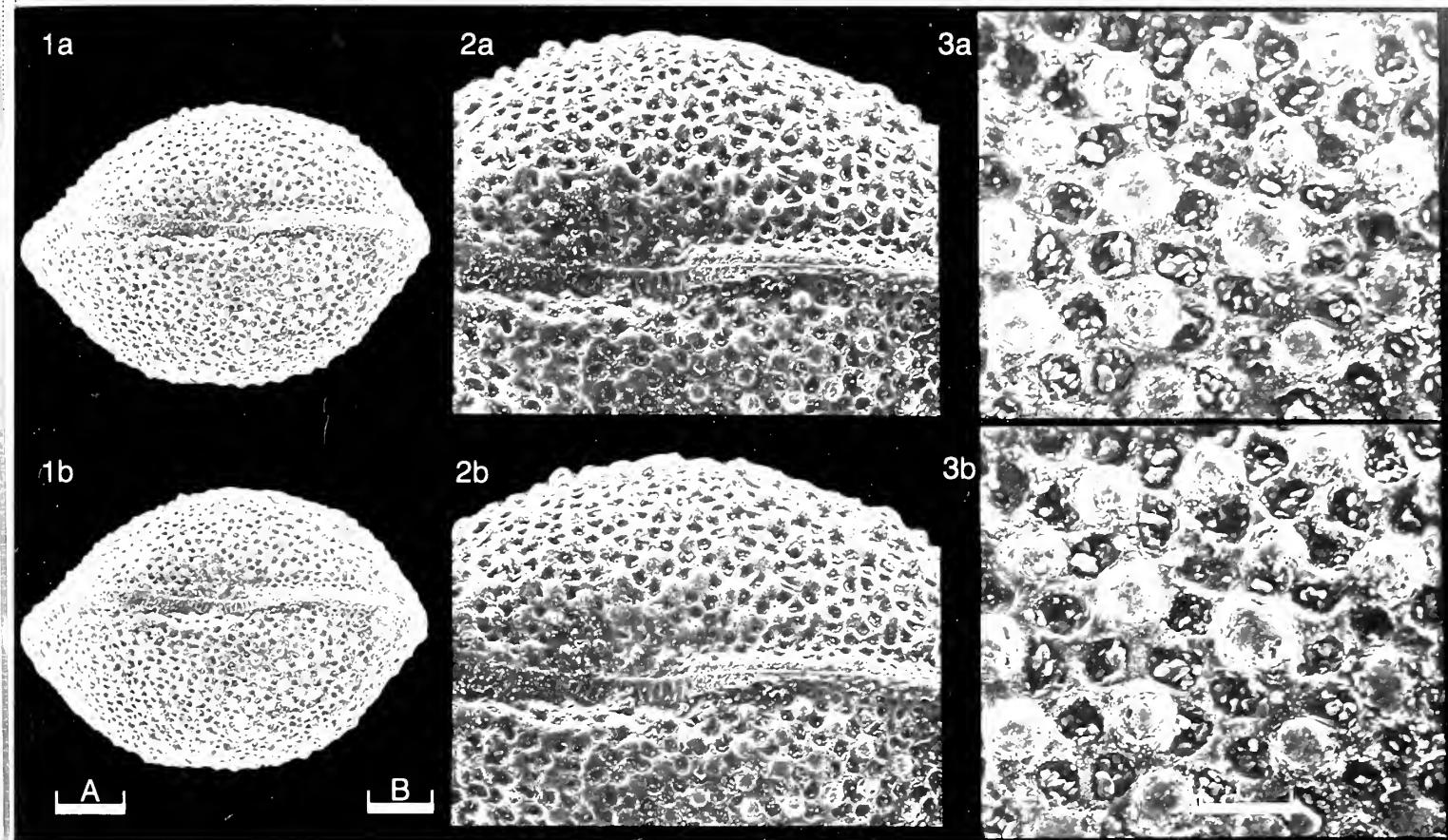
Diagnosis: Large (up to 1mm long) species of *Paracandona* Hartwig; strongly inflated. Anterior and posterior margins well rounded with subequal convexity; dorsal margin generally arched but straighter in the posterior half of the left valve. Ventral area depressed with a post-median concavity. In dorsal view, carapace very wide (width: half the length) with left valve overlapping the right, especially posteriorly (ear-like expansion). Strongly marked ornament: lace-like, consisting of a first-order reticulation with polygonal fossae (diameter about 20-30 µm), and smooth spines (papillae) above the carapace surface; spines show a sub-central pore, are not conjunctive or disjunctive, and always occur within the solum of a fossa. Distance between spines seems to be variable between specimens; no spines along the ventral margin. Hinge adont. Marginal zones larger in anterior and postero-ventral areas than in the upper posterior part; pore canals and vestibulum not seen. Subcentral muscle scars (observed in a single fragmented right valve) probably five scars (three in front, two behind) more or less oblique and elongate.

Remarks: This species has previously been placed within the genus *Paracandona*, an assignment which takes into account external features such as size, shape and type ornament. Its hinge and muscle scars are typical of the Candonidae.

Peyrecave, the type locality of *Paracandona occitanica*, is located in the Aurignac anticline (see Text-fig. 1), and in the "Marnes d'Auzas" Formation. This deposit lies below the "Calcaire Nankin" containing *Orbitoides media* (d'Archiac), *O. apiculata* Schlumberger, *Hellenocyprina beotica* Reichel, and *Nummofallotia cretacea* Schlumberger. The "Marnes d'Auzas" are considered to be one of the last lithologic units of the upper Maastrichtian. Specimens occur predominantly over a 15m thickness (in the middle-upper part) and into grey marls with charophytes; the base and top show a freshwater trend with *Fraimbocythere tumiensis ferreri* Colin, *Cypris* sp. of Babinot, *Neocyprideis* sp., freshwater gastropods (*Islamia* gr. *indecisa* Cossmann) and charophytes such as *Platychara compressa* (Knowlton) Grambast, *Amblyochara begudiana* Grambast, *Peckichara sertulata* Grambast, and *Porochara* sp. The middle part contains more brackish associations with species of *Limburgina*, *Perissocytheridea*, *Cytheromorpha* and benthic foraminifers (*Laffiteina mengaudi* (Astre) and oysters (*Ostrea garumna* Coquand). These

Explanation of Plate 13, 140

Fig. 1,2, LV (**BRPy1**, 1122 µm long): fig. 1, ext. lat. ornament; fig. 2, ext. lat. Fig. 3, LV int. lat. (**PBR3/1**, 1204 µm long). Scale A (100 µm; × 335), fig. 1; scale B (200 µm; × 49), figs. 2,3.



Remarks (contd.): associations probably best approximate to marginal environments such as lagoons or marshes with at times increasing or decreasing salinity. Mixed assemblages occur when temporary oligohaline waters flood down into the marine biotopes. *Paracandona occitanica* is, accordingly, considered to be an oligohaline species.

Distribution: *P. occitanica* is known from areas of southern France and northern Spain.

1. Petites Pyrénées:

Peyrecave (see above): "Marnes d'Auzas" Formation, upper Maastrichtian.

Auzas: 'type locality' of the "Marnes d'Auzas" Formation, in the Saint-Martory anticline); with *Frambocythere tumiensis ferreri* Colin, *Neocyprideis* sp. and charophytes (*Septorella ultima* Grambast, *Peckichara sertulata* Grambast, *Microchara cristata* Grambast).

Pentecôte: near Ausseing, type locality of the Garumnian (A. Leymerie, *Bull. Soc. géol. France*, 2, 19, 1091-1096, 1862); with *Frambocythere tumiensis ferreri* Colin, *Paracandona krsticae* Babinot, *Neocyprideis* sp. and charophytes (M. Massieux et al., *Geobios*, 12, 6, 899-905, 1979). Paillon : 5km E of Auzas; with *Paracandona krsticae* Babinot, *Neocyprideis* sp. and charophytes.

2. Provence:

Les Baux, Alpilles Mountains; lower Maastrichtian (Begudian).

Velaux: 4km NW of Rognac, in blue-grey marls with charophytes; lower Maastrichtian (Begudian).

Saint-Estève-Janson: near the Durance River (sample C930; coll. M. Feist, Montpellier); upper Maastrichtian (Rognacian).

Rognac-Vitrolles: type section of Rognacian (upper Maastrichtian): rare, in grey marls with *Frambocythere tumiensis ferreri* Colin, freshwater gastropods: *Hantkenia armata* (Matheron), species of *Lychnus* and charophytes.

Rousset s/Arc : N Aix-en-Provence syncline: same deposits as above (rare).

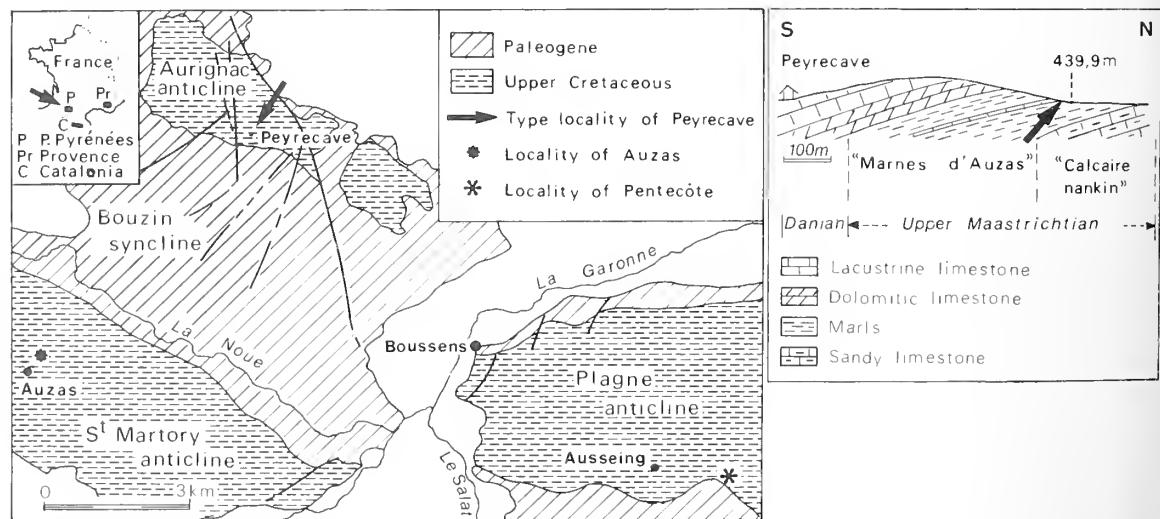
Roques Hautes, near Rousset (sample C1034, coll. Grambast, Montpellier); upper Maastrichtian (Rognacian).

Explanation of Plate 13, 142

Figs. 1-3, juv. car. (PBR3/2, 938 µm long): fig. 1, dors. post. end; fig. 2, dors. ant.; fig. 3, dors. Fig, 4, juv. LV, ext. lat. (PBR3/3, 1030 µm long).

Scale A (100 µm; × 189), figs. 1,2; scale B (200 µm; × 49), figs. 3,4.

Distribution (cont.): 3. Languedoc: Maastrichtian and probably Fuvelian (upper Campanian). Villeveyrac area, Hérault, France : Le Peyrou and Le Pas de Vidal (J.F. Babinot, P. Freytet et al., *Géologie méditerranéenne*, 10, 3-4, 257, 1983); Les Triques (sample C756, coll. M. Feist, Montpellier). 4. Catalonia: Maastrichtian. Vallcebre, N Berga; with *Frambocythere tumiensis* (Helmdach) (coll. Y. Tambareau).



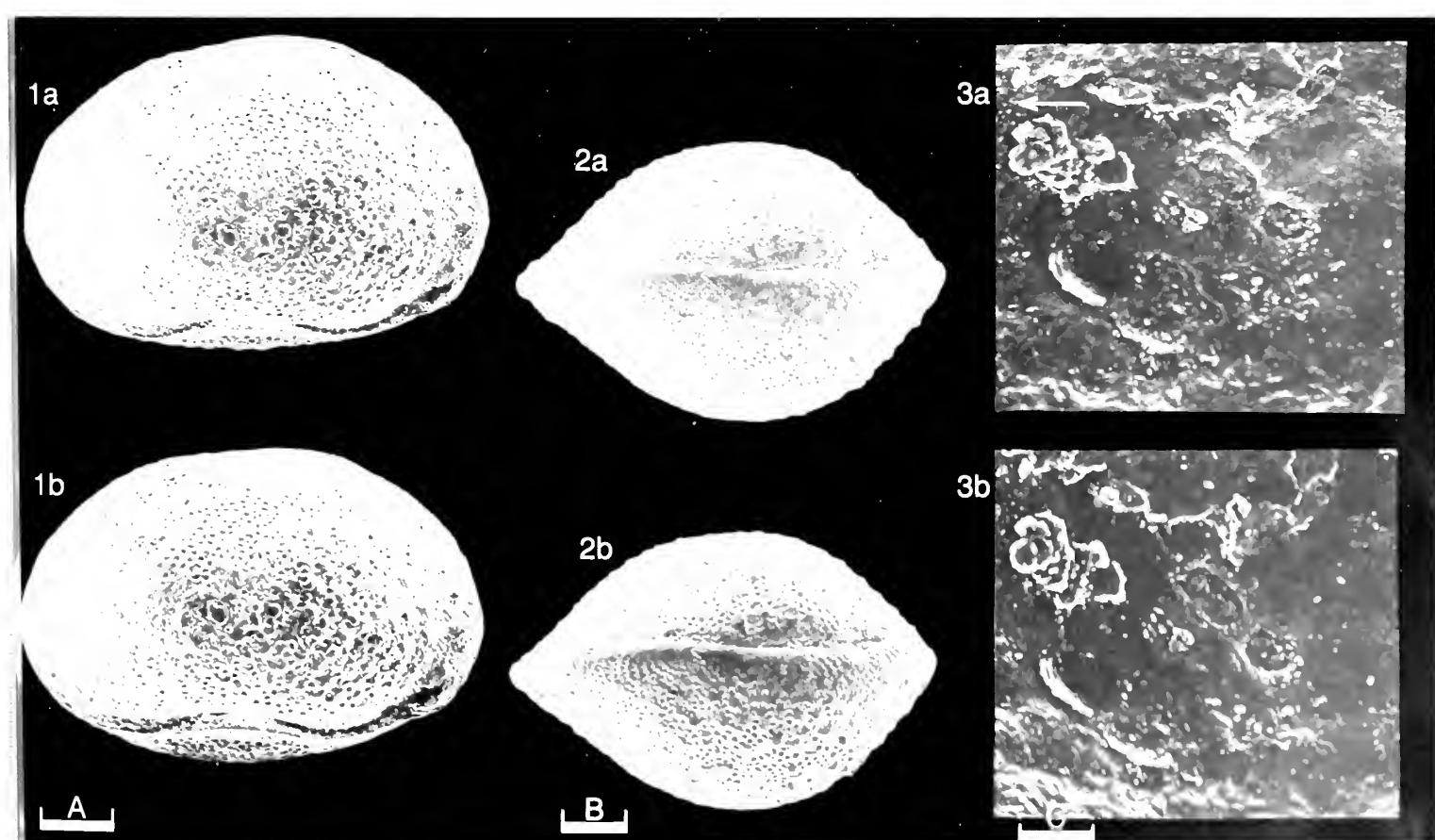
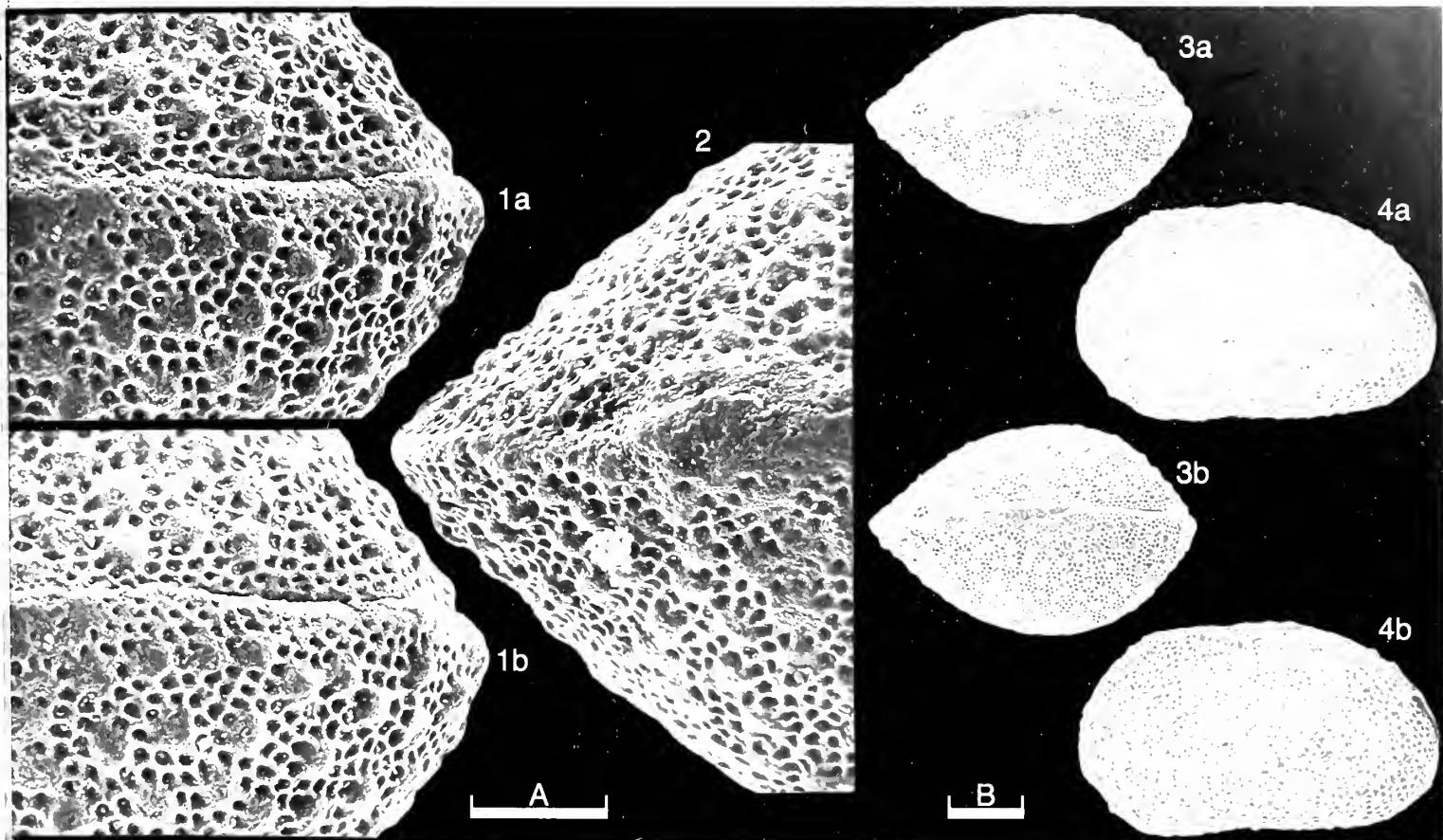
Text-fig. 1.

Areas of occurrence of *P. occitanica*. The type locality, in the Petites Pyrénées area, is arrowed.

Explanation of Plate 13, 144

Fig. 1, car. ext. lat. (BR3Pr1, 1347 µm long); fig. 2, car. dors. (BR3Pr2, 1333 µm long); fig. 3, RV int. lat., muscle scars (BR3Py2, broken).

Scale A (200 µm; × 49), fig. 1; scale B (200 µm; × 45), fig. 2; scale C (50 µm; × 198), fig. 3.



ON *BOLBIHITHIS ABDOMINALIS* SCHALLREUTER

by Roger E. L. Schallreuter
(University of Hamburg, German Federal Republic)

Bolbihithis abdominalis Schallreuter, 1981

- 1981 *Bolbihithis abdominalis* n.sp. R.E.L. Schallreuter, *Geol. För. Stockh. Föhr.*, **103** (1), 61, 63-64, fig. 1.
1984 *Bolbihithis abdominalis* Schallreuter, 1981; R.E.L. Schallreuter, *Neus. Jb. Geol. Paläont. Abh.*, **169** (1), 13.
1985 *Bolbihithis abdominalis* Schallreuter, 1981; R.E.L. Schallreuter, *Mitt. Geol.-Paläont. Inst. Univ. Hamburg*, **59**, 106.
1986 *Bolbihithis abdominalis* Schallreuter, 1981; R.E.L. Schallreuter, *Ostrakoden aus Öjlemyrflint-Geschieben von Sylt*, preprint from U.v. Hacht, *Fossilien von Sytt* 2, pl. 3, fig. 11.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (**GPIMH**) no. **2139**, tecnomorphic RV, anteriorly and dorsally incomplete (Schallreuter 1981, *op. cit.*, fig. 1).

Type locality: Gravel pits in the Keitumer Heide between Braderup and Munkmarsch, Isle of Sylt, N Frisian Is., Germany; 54° 56'N, 8° 21'E. Upper Ordovician Öjlemyrflint erratic boulder (no. Sy35 of Schallreuter collection) of the upper Kaolinsand (lower Pleistocene).

Explanation of Plate 13, 146

Figs. 1-3, ♀ RV (**GPIMH 3433**, 1026 µm long); fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, int. lat.; fig. 4, juv. LV, ext. lat. (**GPIMH 3434**, 591 µm long).

Scale A (100 µm; × 85), fig. 1; scale B (100 µm) × 60), fig. 2; scale C (100 µm; × 65), fig. 3; scale D (100 µm; × 90), fig. 4.

Stereo-Atlas of Ostracod Shells, 13, 147

Bolbihithis abdominalis (3 of 4)

Figured specimens: **GPIMH** nos. **3433** (♀ RV:Pl. 13, 146, figs. 1-3), **3434** (juv. LV:Pl. 13, 146, fig. 4), **3435** (juv. RV:Pl. 13, 148, fig. 1) and **3436** (♂ RV:Pl. 13, 148, fig. 2). All from upper Ordovician Öjlemyrflint erratic boulders of the upper Kaolinsand (lower Pleistocene) near Braderup, Isle of Sylt (no. **3433** from Schallreuter collection no. Sy187, **3434** from Sy212, **3435** from Sy253 and **3436** from Sy115). Boulders collected by Ulrich von Hacht, Hamburg.

Diagnosis: Females 1,00-1,06mm long. Posteroventral lobe rather broad, in tecnomorphs extends posteriorly to the middle of the posterior field, in females it occupies the whole field. Spine of the posteroventral lobe weak in adults, and relatively larger the smaller the larvae. Velar flange narrow in tecnomorphs, in females moderately broad and weakly convex. Surface reticulate.

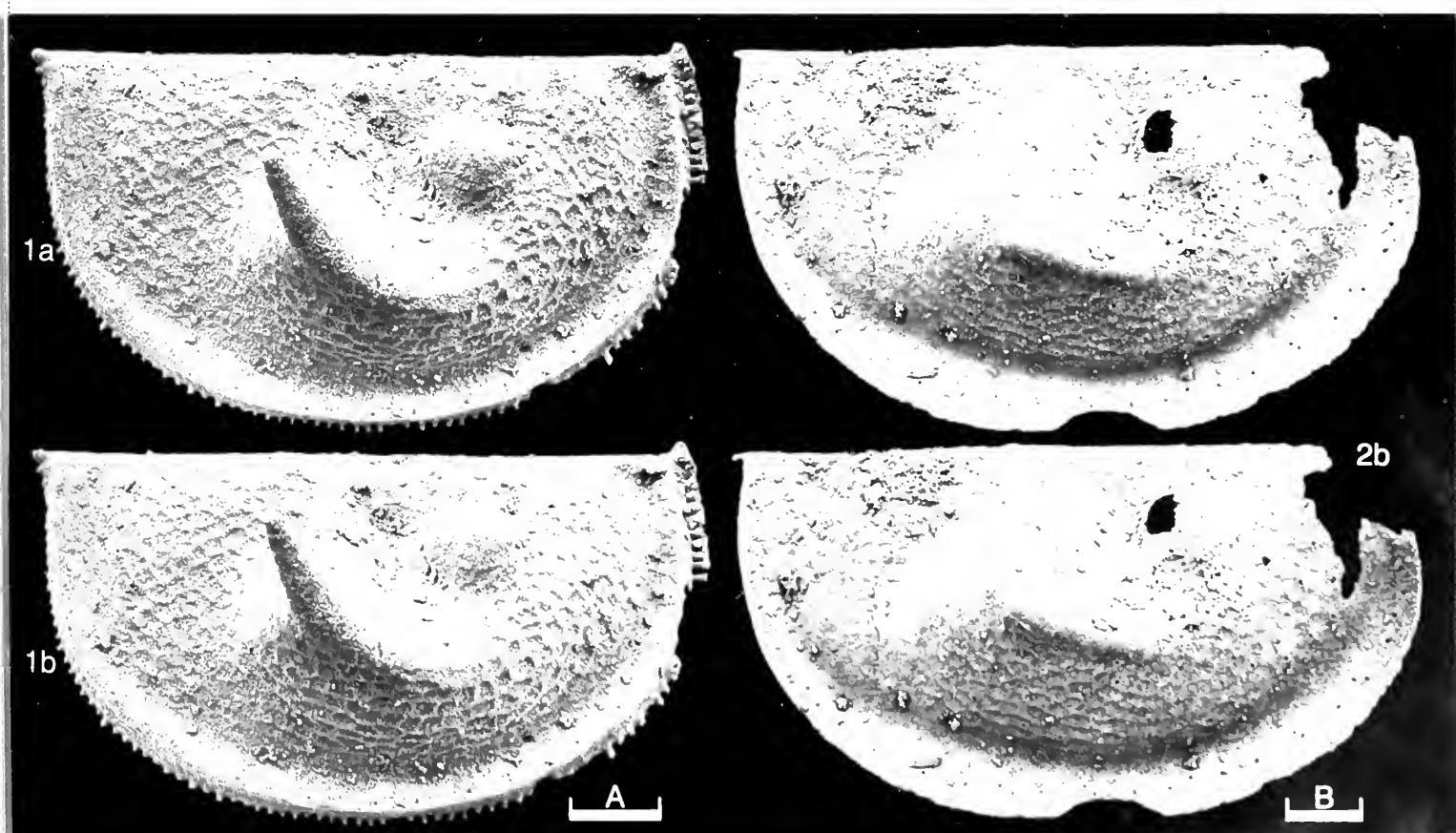
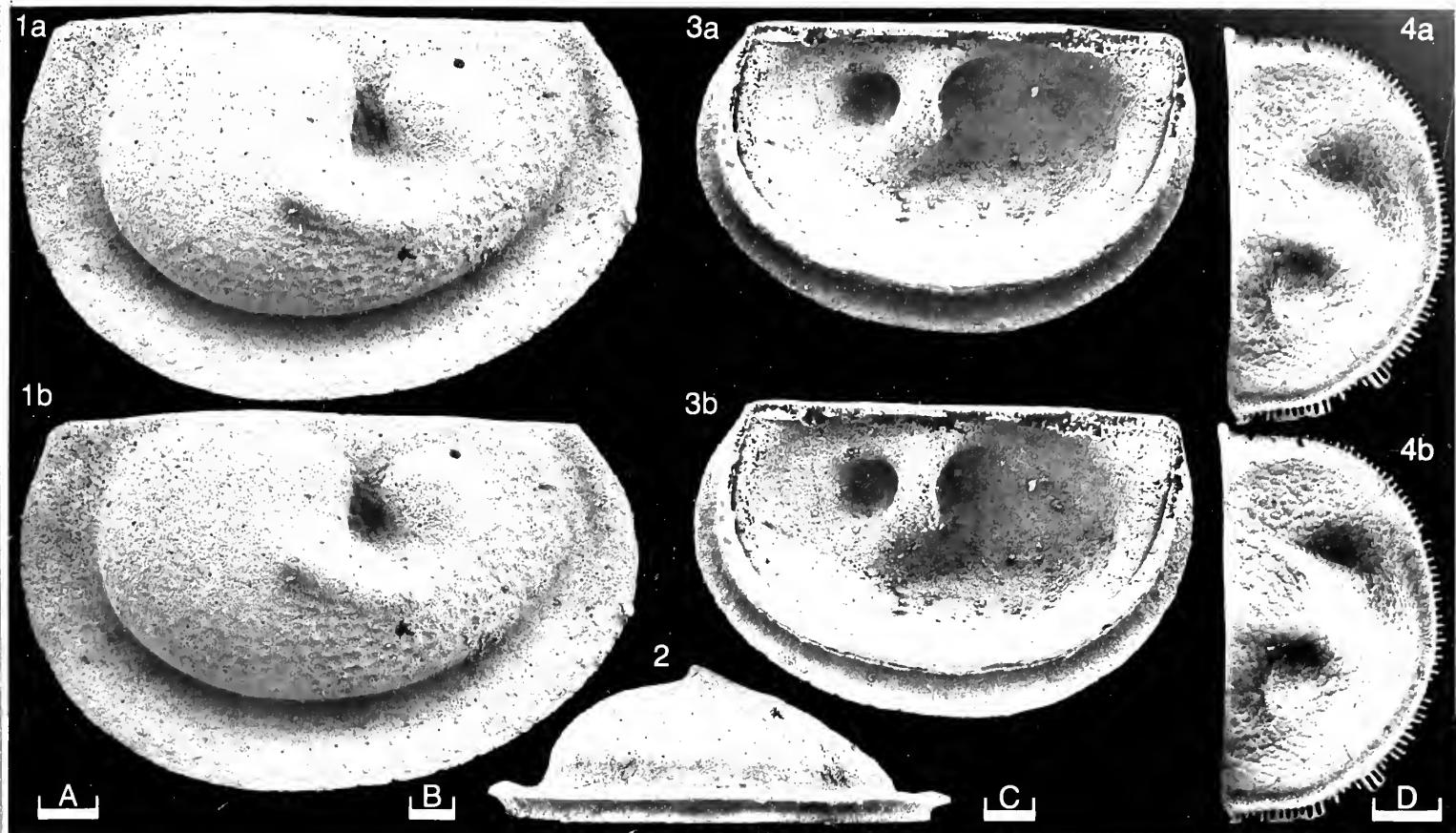
Remarks: The middle Ordovician type-species of *Bolbihithis* Schallreuter, 1967, *Bichilina prima* Sarv, 1959, is of the same size and exhibits the same kind of velar (antral) dimorphism [R.E.L. Schallreuter, *Palaeontographica* (A), **144** (1/3), 71-72, pl. 24, figs. 5-11, 1973] but *B. abdominalis* is clearly distinguished by the dimorphism of its posteroventral lobe. This kind of domiciliar dimorphism also occurs in *Bolbina* (for example, in *B. major*) and was therefore called 'bolbinid domiciliar dimorphism' (R.E.L. Schallreuter 1985, *op.cit.*, 106; *Trudy Palaont. Inst.*, **172**, 111, 1979).

Distribution: Known only from erratic boulders. Found in uppermost Ordovician Öjlemyrflint erratic boulders from the Isle of Gotland (Baltic Sea), the Isle of Sylt (N Sea) and the westernmost part of Niedersachsen (Wielen), and from an upper Ordovician erratic limestone boulder (no. 85/191) from Ahlntel, Westphalia.

Explanation of Plate 13, 148

Fig. 1, juv. RV, ext. lat. (**GPIMH 3435**, 688 µm long excluding spines); fig. 2, anterodorsally incomplete ♂ RV, ext. lat. (**GPIMH 3436**, 914 µm long).

Scale A (100 µm; × 130), fig. 1; scale B (100 µm; × 100), fig. 2.



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